

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXV: No. 8.

New York, Thursday, February 19, 1880.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

The Domnarvet Iron Works.

Near the ancient mining town of Falun the latest addition to the list of iron establishments in Sweden—the Domnarvet Iron Works—has been built, and it will be of interest to examine by what means those who planned this large enterprise have sought to make the best of the natural advantages aiding them in the struggle with their competitors in home and foreign markets. After the decline of copper mining, iron manufacture became more prominent, and it was decided in 1873 to build at Domnarvet, 14 miles from Falun, on the River Dal Elf, an establishment which should embody the latest improvements. The Bergslags Railway, connecting Falun and Göteborg, Sweden's main port on the German Ocean, crosses the Dal Elf near Domnarvet, thus affording facilities for the receipt of iron ore and the shipment of finished product. At this place considerable water power is obtained by a weir across the river, and saw-mills, with six double and four single saw frames, are established on the left bank, capable of converting from 300,000 to 400,000 logs annually into planks, the ribs and slabs from which are carbonized for iron works, while the sawdust is sufficient for heating from 8000 to 10,000 tons of blooms in appropriately constructed mill furnaces. The same

a 3/4-inch iron casing, carried by an iron ring which rests upon eight columns. There are six tuyeres, a cinder tap 9 inches below tuyere level, and an iron tap through which the iron flows into a gutter directly to the Bessemer converters, situated on a lower level. The hearth and the lower part of the boshes of the blast furnace are made, as usually in Sweden, by ramming a mass of powdered quartz and a little clay around a core. The gas down-comer is about 3 feet in diameter, and terminates in a conical washing box, in which the dust is deposited. The hot-blast stove for each furnace has 2000 square feet of heating surface, in cast-iron pipes of elliptical section, 14 feet long. The heating gas is burnt in a combustion chamber in front of the stove. The table of analyses of ores given below, from mines partly belonging to the works, may serve to show the nature of the raw material worked. When it is considered that the pig made from them is smelted with charcoal, it will be understood why the product is one of great purity.

As usual in Sweden, these ores are calcined in Westman kilns, broken to the requisite size in Blake crushers. The furnaces are run with blast, having a pressure of 2.4 inches of quicksilver, and heated to about 950° F. The metal, as we have already stated, is run directly into the Bessemer

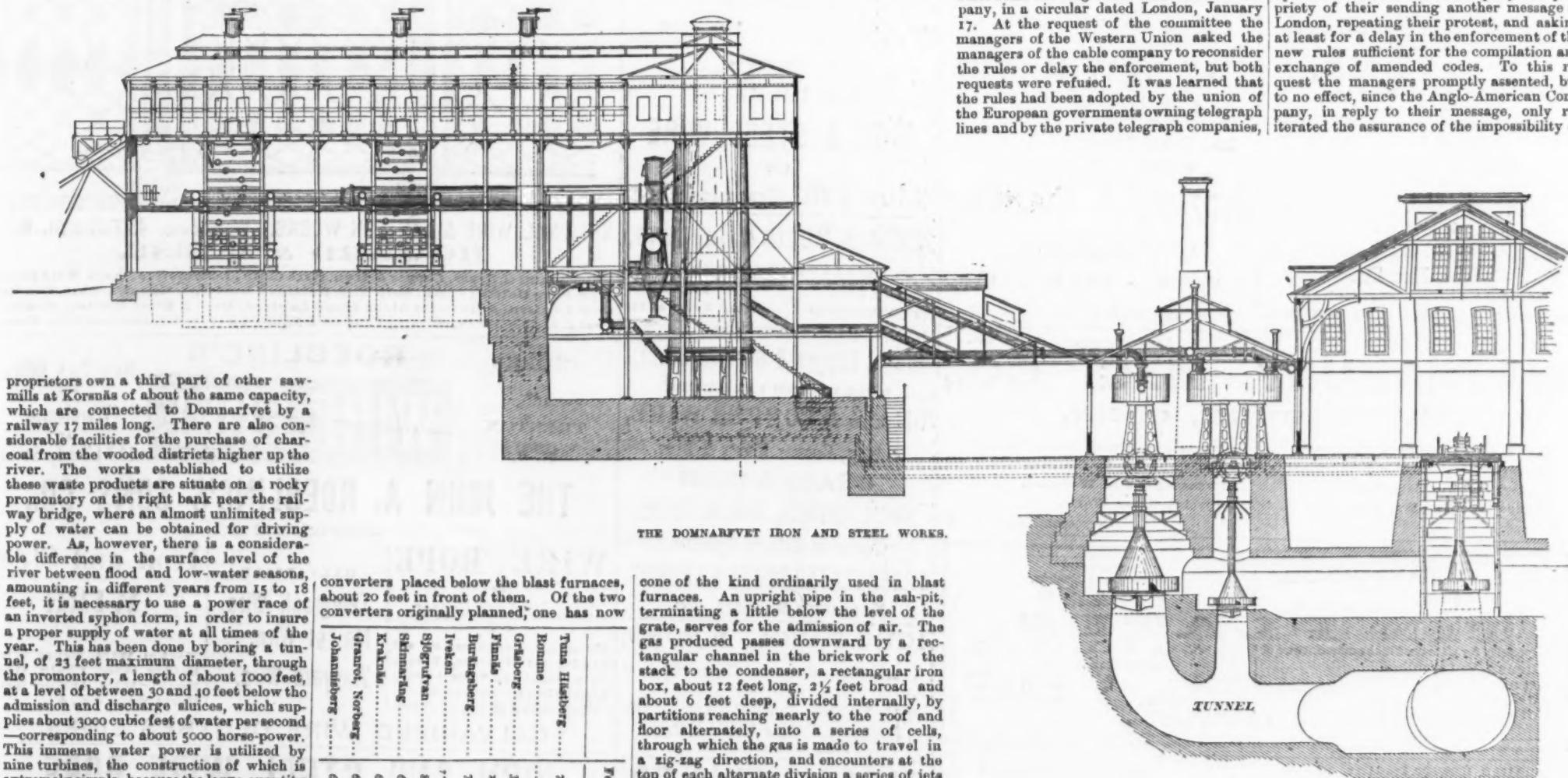
converters placed below the blast furnaces, about 20 feet in front of them. Of the two converters originally planned, one has now been finished capable of working 5 1/2-ton charges. It is of the usual Swedish pattern, 4 feet 3 inches diameter at the bottom, 5 feet 2 inches in the widest portion and 7 feet 6 inches high. There are 13 tuyere bricks, each having 7 holes. The ingots are handled by two 10-ton portable steam cranes. One of the two 5-ton open-hearth furnaces originally planned is now built. Since its erection Mr. Lilienberg, a Swedish engineer now traveling in this country, has, in the *Jern Kontoret's Annaler*, drawn attention to the construction adopted at Gratz, Austria, which he considers superior in some respects to the Domnarvet type. The main advantages of the modified furnace are a more convenient arrangement of the regenerating chambers, and some changes in the construction of the roof. The Domnarvet furnace is charged with bar ends and with Bessemer scrap, which, owing to the low temperature in the converters, cannot be worked in them. One week's output was 67 tons of ingots and 3 tons scrap, while the charge of the furnace had been 24 tons of pig and 51 tons of bar ends. For this and many of the other furnaces, sawdust and other refuse is used in gas producers. These are chambers with cylindrical stacks, 7 feet in diameter and about 12 feet high, contracted by a conical fire-box to 4 feet diameter at the bottom, where there is an ordinary fire-grate. The top is covered by a flat brick arch, perforated by a tube, forming the feeding hopper, which is closed by a movable

but partial and liable to beget confusion. The recent decision of the Supreme Court, by which the present trade-mark law was pronounced unconstitutional, was cited in support of the proposition that any law which should be enacted under the commercial clause of the Constitution would be ill advised and short-sighted legislation. He held that the subject was indivisible by State lines, and could not, by any possibility, be included in the question of interstate commerce; that it was more a part of manufactures than commerce, and could only be permanently reached and determinedly settled by a constitutional amendment. The matter was referred to a sub-committee, with instructions to report at an early day to the full committee for their action.

The New Rules for Cable Messages.

The Produce Exchange Committee of Trade has made a report on the new, and it is claimed, unjust rules promulgated for the government of code messages by cable to take effect April 1. The use of certain classes of words heretofore allowed is prohibited, and the rules necessitate the re-compilation of many existing codes at great labor and expense. The committee found that the Western Union had received the new rules from the Anglo-American Cable Company, in a circular dated London, January 17. At the request of the committee the managers of the Western Union asked the managers of the cable company to reconsider the rules or delay the enforcement, but both requests were refused. It was learned that the rules had been adopted by the union of the European governments owning telegraph lines and by the private telegraph companies,

this extra charge has for some years past been made here on messages to other countries. The second rule, viz., the prohibition of proper names for use as code words, involves a general change, and forms the more serious cause of complaint, since many codes now in use are largely composed of such words. Nor can any intelligible reason be given why the use of proper names as cable words should be objected to, when the use of such names in their plain sense is allowed in code messages, as well as in ordinary telegrams. Being impressed with the justice of the complaint, your committee sought an interview with the managers of the Western Union Telegraph Company, and were informed that the new regulations had been communicated to them by the managers of the Anglo-American Cable Company by a circular, dated London, January 17th; that on receipt of these instructions they promulgated them, as they were bound to do, but that they at once remonstrated to the Anglo-American Cable Company by cable, and requested their withdrawal of the rules, on the ground that great inconvenience and dissatisfaction on the part of the commercial patrons of the cable was to be anticipated from their enforcement; that the Anglo-American Cable Company, however, in reply, stated that a reconsideration of the rules was impossible. The reasons for this refusal having been explained to them, your committee then urged upon the Western Union Company the propriety of their sending another message to London, repeating their protest, and asking at least for a delay in the enforcement of the new rules sufficient for the compilation and exchange of amended codes. To this request the managers promptly assented, but to no effect, since the Anglo-American Company, in reply to their message, only reiterated the assurance of the impossibility of



THE DOMNARVET IRON AND STEEL WORKS.

proprietors own a third part of other saw-mills at Korsnäs of about the same capacity, which are connected to Domnarvet by a railway 17 miles long. There are also considerable facilities for the purchase of charcoal from the wooded districts higher up the river. The works established to utilize these waste products are situated on a rocky promontory on the right bank near the railway bridge, where an almost unlimited supply of water can be obtained for driving power. As, however, there is a considerable difference in the surface level of the river between flood and low-water seasons, amounting in different years from 15 to 18 feet, it is necessary to use a power race of an inverted siphon form, in order to insure a proper supply of water at all times of the year. This has been done by boring a tunnel, of 23 feet maximum diameter, through the promontory, a length of about 1000 feet, at a level of between 30 and 40 feet below the admission and discharge sluices, which supplies about 3000 cubic feet of water per second—corresponding to about 5000 horse-power. This immense water power is utilized by nine turbines, the construction of which is extremely simple, because the large quantity of bark from numerous saw mills floating down the river will not permit the use of wheels having guide curves or any system of dividing the wheels. This necessity to avoid any passages liable to be filled with obstructions, naturally reduces the duty of the turbines, which it is estimated do not yield more than 55 per cent. of the theoretical maximum. The largest are about 15 feet in diameter, with four discharge channels so shaped to a circular curve in plan and covered by segmental plates curved to the same radius, working on a fixed center, that the waterway may be enlarged or contracted in order to regulate the speed of the wheels. These sluices are connected by angle levers on parallel rods, with a collar sliding on the main shafts which can be moved up or down by a centrifugal regulator, driven off the fly-wheel shaft and acting against a loaded rod. Two 400-horse-power turbines drive the Bessemer blowing engines, two 100-horse-power wheels run the blast furnaces blowing engines, one 400-horse-power turbine is used for the heavy plate mills, one 400-horse-power wheel is set aside for two bar and rail mills, while three 200-horse-power wheels are used for other mills and machinery.

The accompanying illustration, an elevation of the Domnarvet Works, clearly shows how the plant is arranged. The ore is carried to the level of the roasting furnaces by means of an inclined plane. The original design included four Westman gas calcining kilns and four blast furnaces, two of each of which are now completed. The blast furnaces, which are placed a little lower than the roasting kilns, are of the ordinary Swedish type of charcoal furnaces, with steep boshes. Their height is 54 Swedish feet, and the diameter of the boshes 10 feet. The walls of the stack are made of thin fire-brick work, with

converters placed below the blast furnaces, about 20 feet in front of them. Of the two converters originally planned, one has now

	Fe ₂ O ₃	FeO	MnO	MgO	CaO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	H ₂ O	S	P
Tuna Hillberg	71.04	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007
Rönne	55.44	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007
Grönberg	55.44	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007
Falun	55.44	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007
Burgholm	55.44	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007
Irén	55.44	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007
Sjögrunden	55.44	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007
Korsnäs	55.44	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007
Grönberg, Norberg	55.44	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007
Johannsdal	55.44	0.77	0.40	1.86	4.20	3.33	10.34	0.016	0.40	0.018	0.007

one of the kind ordinarily used in blast furnaces. An upright pipe in the ash-pit, terminating a little below the level of the grate, serves for the admission of air. The gas produced passes downward by a rectangular channel in the brickwork of the stack to the condenser, a rectangular iron box, about 12 feet long, 2 1/2 feet broad and about 6 feet deep, divided internally, by partitions reaching nearly to the roof and floor alternately, into a series of cells, through which the gas is made to travel in a zig-zag direction, and encounters at the top of each alternate division a series of jets of water, which cool it and remove the steam and other condensable substances with which it may be mingled, and deliver it in a dried state to the main gas-flue, whence it flows into the regenerators in the usual way.

The Bessemer converter is supplied by a 2-cylinder blowing engine, having a 4-foot stroke and cylinders 4 feet in diameter, which is shown in our engraving. A second one is now building. One of the two blowing engines for the blast furnaces is also in operation. The rolling mill is to contain one three-high bar train, one three-high rod train, one boiler-plate train, one rail train, two trains for tires and two additional ones for bars and plates. Four of these are now completed, with their reheating furnaces. When completed, the Domnarvet Works will be one of the largest and best equipped in Sweden. In possession of a large supply of ores of exceptional purity, of an unlimited water-power, cheap fuel and good transportation facilities, these works combine many of the most essential elements of success.

In an address before the House Committee on the Judiciary, a few days ago, Representative McCoid, of Iowa, gave his views on the proposed constitutional amendment affecting trade-marks. Mr. McCoid held that it did not involve any change in the Constitution, but simply made possible the execution of the unfinished will of its framers. The analogous subjects, patents and copyrights, had been incorporated in the grant of powers to the general government, and had the subject of trade-marks possessed the same importance at that time that it has to-day, it, too, would have been incorporated. The protection of trade-marks requires a uniform, universal, harmonious system of legislation by the general government exclusively for the whole country, and this can only be secured by the proposed amendment to the Constitution. Any other legislation, even if constitutional, will be

and that although the Anglo-American Cable Company is not a member of the union, it has to submit to the union's rules so far as forwarding messages is concerned. Complaint is also made that although the rules were adopted on August 1, they were sent to the Western Union so late that in many cases the notice given is too short for the timely exchange of new codes. The committee presented the following resolution: "Resolved, That the New York Produce Exchange strongly condemns the arbitrary and oppressive action of the European governments and private companies having control over our cable connections, in establishing new and unnecessary rules for the government of code correspondence, thereby inflicting great hardship and expense on the commerce of the world, and that this Exchange also blames the Anglo-American Telegraph Company for the delay in the promulgation of the new rules, whereby the said injury has been aggravated."

The following are the objectionable features of the new rules:

1. The maximum length of a chargeable word will be fixed at 10 letters. Should a word contain more than 10 letters, every 10 or fraction of 10 letters will be counted as a word.
2. Code messages must be composed of words in the English, French, German, Spanish, Italian, Dutch, Portuguese and Latin languages. Proper names (i. e., names of persons and places) will not be allowed in the text of code messages, except in the manner they are used in ordinary private messages.

Concerning them the committee says: "The first of these rules affects mainly the correspondence with England, where the Anglo-American Company has hitherto borne the extra charge made by the land lines for words containing more than 10 letters, while

modifying the tenor or postponing the inauguration of the obnoxious rules.

Gen. Daniel Ruggles, of Virginia, at the request of the Senate Committee on Agriculture, appeared before them a few days ago and briefly explained his method of precipitating rainfalls by scientific means. His method (for which he has recently been granted a patent) is to send up to the cloud realm cartridges of dynamite or similar explosive materials in skeleton balloons, and to explode them, either by time fuses or by magneto-electricity, through light metal wire connecting the balloons with the earth. Gen. Ruggles, as the result of many years of study and investigation of this subject, claims that the diffused mists passing over regions or localities suffering from unusual drought may readily be consolidated into rainfalls by concussions and vibrations thus artificially produced, and he has, therefore, suggested to the committee that Congress might provide a small appropriation for expenditure by the Commissioner of Agriculture, to test the practicability of aiding the agricultural interests of the country in this manner. The committee listened to Gen. Ruggles' statements with much interest, and requested him to prepare an amplified memorial on the subject with a view to their taking it more fully into consideration at an early day.

Capitalists and speculators have been actively at work for some time securing options on all the coal in the Connellsville region whose owners would become parties to such agreements. In most cases they have been successful, and there are very few farms in the region within easy access of railway lines under which the coal has not been sold absolutely or at option.

* One Swedish foot = 11.69 inches.

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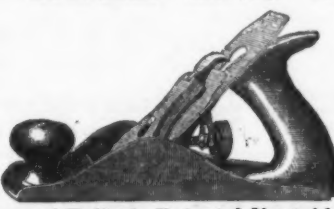
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Free Trade and Protection.

The following letter, written by Mr. Thomas H. Dudley, late American Consul at Liverpool, to Mr. Charles Edward Rawlins, of Liverpool, has found its way into print and merits careful perusal. It is not an ingenious argument, but a plain statement of facts, susceptible of abundant proof, and as such it should carry conviction to all unprejudiced readers:

CAMDEN, N. J., January 20, 1880.

To Charles Edward Rawlins, Esq., Liverpool.—DEAR SIR: Your letter of the 8th ultimo was duly received. I noted its contents and read with attention all you said about our tariff system and your ideas with regard to free trade. I do not see these questions as you do; indeed, I entertain views directly opposed to yours, and I have no doubt that, if you should ever visit this country, you would at least modify your views upon these questions, if you did not entirely agree with me before you left us.

You would see what protection is doing and has done for us; that under its fostering and benign influence we, in almost every branch of manufactures and human industry, are supplying ourselves with products quite equal in finish and quality to those made anywhere, and in very many branches are now in the market with our goods and products competing with the world; our cotton goods are largely exported, and we are your competitors in cotton fabrics everywhere. We are sending clocks, watches, dental instruments, edge tools and other manufactured commodities to England, locomotives to Russia and Brazil and carpets to Norway and Sweden. With every variety of climate and soil and almost unbounded mineral resources, in a few years, if our tariff system should remain as it is, we will become independent of Europe in almost everything, and in very many, if not most, branches of industry, be actual competitors with you in all the markets of the world. In this small State of New Jersey more than 10,400 people are now engaged in the manufacture of silk. The fabrics we are making equal those made in France, while our sewing silk is said to be the best made anywhere. We expect next year to export the last-named product to England, and before two years have passed to supply Europe with sewing silk. I single out and refer to the silk business among many other and vastly larger and more important branches of industry because it is new—the growth of the last seven or eight years—and clearly and entirely the child of protection; and I have confined it to my own small State because I have not the statistics of this industry in any of the other States.

Our census, which is to be taken this year, will show a condition of things with regard to our products, manufactures and industries which will astonish Europe. We are making rapid—most rapid—progress in every branch of human industry. With regard to commerce, I do not see how free trade will ever help us to build ships, though I am ready to concede that free trade will create a demand for ships.

Protection means that the people are to be transported to where the food and the products for manufacture are produced, and that there the commodities shall be manufactured. Free trade means the reverse of this; the people are to remain where they are, and the food to feed them and the material to be manufactured are to be taken to them. To transport the raw material (cotton) across the ocean, and the food to feed the operatives, requires ships and costs money, and the consumer of the manufactured product, wherever or wherever he may be, has to pay this cost. Fortunately for us, our people in the West have already seen this, and are now largely engaged in manufacturing, while the people at the South are beginning to see it, and consequently are building manufacturing; and the coming census will show an advance in the South and West which will astonish you. Chicago will appear as one of the largest manufacturing towns in the country, and the State of Ohio and those States to the west of it will soon equal the East, if not in kind, at least in quantity and value of the commodities they manufacture.

You build ships; we build and equip railroads and steamers for our rivers and lakes. Your commerce is mainly on the sea and ours more on the land. I presume we put more money into railroads, locomotives, cars and steamers for our rivers and lakes than you put into your ships. When we find it more profitable to build steamships for the ocean than to build railroads and steamers for our inland navigation, we shall do it; and the day may come, and is probably not very far distant, when even without the subsidies which you give your lines of steamers (and which to this extent is only protection in another form), you may again find us your competitors upon the ocean as well as on the land.

AGRICULTURAL PRODUCTS OF THIS COUNTRY.

The Agricultural Department at Washington has just published an estimate of some of the agricultural products of our country for the year 1879. Their value is put down at \$1,904,480,659. I suppose this to be a great undervaluation; but taking it as stated let us examine it, and make an estimate as to what we consume at home and what we sell abroad.

Grain (or corn) all kinds is valued at	\$1,247,119,000
The hay crop at	325,851,280
Cotton at	231,000,000
Potatoes at	78,971,000
Tobacco at	21,545,591

In 1878 the corn which you imported from all countries amounted in value to \$29,064,875. This, I suppose, is its computed value when landed in England, and not the value at the place whence it was imported. Of this quantity only a fraction more than one-half was from the United States—say what we received for it in value in our money, \$142,936,995—and if other foreign countries took \$60,000,000 more in value, then as compared with our crop for 1879, you would leave at home for domestic consumption an amount valued at \$1,044,178,005.

The hay crop is nearly all consumed at home, and so is the potato crop. The one is valued at \$325,851,280, the other at \$78,971,000.

The value of cotton imported by you is stated to be \$33,519,549. Supposing that two-

thirds of this was from the United States, the value of what you imported from our country would then amount in our money to \$108,156,411; and if we shipped to other foreign ports \$10,000,000 in value, there would be left for home consumption an amount worth \$112,843,589.

The value of manufactured tobacco imported into England is stated at about \$2,500,000. Now, if two-thirds of this came from the United States—say \$8,066,666—there was left over \$13,000,000 worth for home consumption. The result in respect to the articles named is this: We, in our manufactures at home, used or consumed, as the figures stand, over \$1,575,000,000 in value. While I have given you, as I think, full credit for all if not more than you took of what we exported, I am satisfied the amount we consumed at home was at least one-fifth more than is stated, owing to undervaluation of our production, and that our consumption of these five agricultural products amounted in value to over \$1,900,000,000, as against less than \$330,000,000 which we exported or sold abroad.

Now this estimate of the agricultural products of our country is limited to the five named articles, and does not include meat, hogs, cattle, sheep or horses; or the vegetable crop (excepting potatoes) which in this country, both in variety and quantity, is enormous, and constitutes a large item in the food of our people; or the fruit crop, including the apple, peach, pear and grape, and the smaller fruits that are raised by the ton; or the fish, poultry, eggs, rice, butter or cheese. None of these are included, and when taken together they amount in value to many millions of dollars. Now of the agricultural products which we raise, I do not suppose one-fifteenth part is exported abroad, certainly not more than this quantity, while the remainder remains at home, and is consumed or used by our people who are engaged in manufacturing and commercial pursuits, &c.

THE HOME MARKET OF MOST VALUE.

The home market is, therefore, more important to us than the foreign; and the more we stimulate and increase it, the better it is for the agricultural as well as every other interest in the country. Protection does this; it sustains the manufactures, thereby making a market for the farmers. It even does more, for it encourages new enterprises. But for our protective tariff, we should not have had the silk manufactures. The 10,400 people in the State of New Jersey engaged in this business are all fed by our farmers. The nation is benefited as well. It gives employment to our people, and the profits to the manufacturers on the \$13,000,000 in value of silk goods produced yearly are saved here; that is, whatever they make is made in this country and goes toward the increasing wealth of the nation; and the capital thus saved or accumulated here is employed in developing the country and its numerous resources and industries.

One manufacturer in the silk business at Paterson in New Jersey, is said to have made a million of dollars. I am informed he has invested all this money, whatever it may be, in the town where he lives in building houses and other improvements. Now, who is injured by this? Not the people, because the duty on silk is just the same now that it was when imposed years ago as a mere revenue duty; for silk goods are cheaper at the present time than they were when the duty was imposed; the fact, in this as in many other instances of production, being that there is a reduction in price of the goods produced by reason of domestic competition.

Steel rails a few years ago, and before we began to manufacture them, cost us in England \$140 per ton. We are now manufacturing them here for \$60, and within the past two years the price has been \$40 per ton. So with cotton fabrics; they are cheaper than they ever were—indeed, so cheap that we are sending them to England by the million of yards, and competing with you in your own market. It is no answer to say of some of these commodities—steel rails, for instance—that they are cheaper in England than they are here in America. So far as the rails are concerned, this, at the present time, may be true; but it is not so with regard to cotton goods, watches, clocks and many other kinds of protected goods which we are sending to your market. They are cheaper here, and cheaper when exported to England, than those which you manufacture; hence we are competing with you in your own market. And with regard to steel rails, every one knows that, if we were to stop manufacturing them and to rely upon you for what we require, the price in England would not remain where it is, but would immediately advance to an extent probably more than the difference now existing between the price here and in England, so that the end would be that we should have to pay you more than we are now paying for those made here. This is the natural consequence of trade, and follows just as surely as the night follows the day.

You may ask why, if we can produce cotton fabrics, edge-tools, clocks and watches cheaper than you, we require protection for these commodities, &c. My answer is that it is quite probable that, in some particular descriptions of cotton fabrics and manufactured products, we cannot compete and require protection to enable us to work up to the production of them; but in those branches where we can compete and are competing, we require protection to keep our market steady and to maintain the domestic competition.

It is a fact in the commercial world, of which you do not require an example, that foreign competitors, when there are no impediments, will, in order to disturb markets and break down competition, sometimes combine to flood the foreign market. They will actually sell without profit to accomplish their purpose, in the hope that in the end, with the confusion in business and destruction in trade in breaking down domestic competition, they can make up more than they lose. I myself have known a foreign manufacturer to sell his goods in America for a less price than you could buy them for in England, and for less than he was selling the same kind of goods for there. While consul at Liverpool, numerous instances came to my knowledge in which there were

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For Sale.—A limited amount of the celebrated
Hibernia on Cornwall (N. Y.) Hematite,
and "Lake" (Magnetic Bessemer).

J. W. HOFFMAN & CO.,
Iron Merchants & Railway Equipments.
205 South Fourth St., Philadelphia.
Sole agents Glasgow Iron Co. and Pine Iron Works
manufacturers of Muck Bar and all grades of Plate
Iron. Celebrated "Glasgow" and "Pine"
brands for fire boxes and difficult flanging. Pig and
Bar Iron, Rails and all shapes in iron. Quotations
given on Bridge and Building Specifications.



LOCOMOTIVE AND CAR WHEEL TIRES,
Manufactured from the celebrated OTIS STEEL
BRAND
STANDARD.
Quality and efficiency fully guaranteed. Prices as
low as any of the same quality. We manufacture
Heavy and Light Forgings, Driving and Car Axles,
Crank Pins, Piston Rods, &c.
Works at Leavittown, Pa.
Office, 220 S. 4th St., Philadelphia, Pa.

WROUGHT IRON
Boiler Tubes,
Steam, Gas and Water Pipe.
Oil Well Tubing, Casing and
LINE PIPE.
Cotton Presses, Forgings,
ROLLING MILL AND
General Machinery.

READING IRON WORKS,
261 S. Fourth St., Philadelphia.

Connellsville Coke.
ORES, Native and Foreign.
FRANCIS WISTER,
230 South Third Street, Philadelphia.
Best Coke for Furnaces and Foundry Use.

J. F. BAILEY & CO.,
216 South 4th St., Philadelphia. 52 Wall St., (Room 8) New York.
Selling Agents
ATKINS BROS.—BEAMS, CHANNELS, RAILS, &c.
**A. & P. Roberts & Co.—Car Axles, Plates, Channels, Tee,
Angle and Bar Iron.**
Philadelphia Agents Central Iron Works, Harrisburg, Pa.—Boiler, Ship and Bridge Plates.
WILLIAM McILVAIN & SONS—Boiler, Ship and Bridge Plates.
BERWICK R. M. BARS AND SHAPE IRON.
Advances on Consignments of Old Material and sales promptly made.



HEBERTON & CO.,
Selling Agents and Commission Merchants
For the sale of
**Pig, Bloom, Plate, Bar, Scrap, Galvanized,
Black, Sheet, Pipe and Railroad**
IRON,
No. 333 Walnut St., Phila.
Charcoal Bloom and Pig a specialty.

Iron.
JUSTICE COX, JR. CHARLES K. BARNS.
JUSTICE COX, JR. & CO.,
AGENTS FOR
Chickies, St. Charles, Montgomery
and Keystone
Foundry & Forge Pig Iron.
CATASAUQUA MFG. CO.'S
Bar, Angle, Skelp and Sheet Iron.
RAILROAD CAR AXLES.
NEW AND OLD RAILS.
No. 333 Walnut St., Philadelphia.

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307 Walnut Street, Philadelphia,
59 Broadway, New York,
44 Second Street, Baltimore,
Importers of
German and English

SPIEGELEISEN,
Pig, Scrap,
NEW AND OLD RAILS,
And Iron Ore.

E. W. CLARK & Co.
Bankers and Stock Exchange Brokers,
No. 35 South Third St., Philadelphia.

CLARK, POST & MARTIN,
No. 34 Pine St., New York,
Bankers and Railway Commission Merchants,
Importers of
Pig Iron, New and Old Rails, Scrap Iron, &c.

D. W. R. READ. T. HORACE BROWN.
D. W. R. READ & CO.,
General Commission Merchants,
ORES, METALS, &c.
Spanish, Algerian and Domestic Ores or
Iron, Manganese, &c.
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J. O. RICHARDSON,
IRON COMMISSION MERCHANT,
No. 232 Dock St., Philadelphia.
Pig Iron, Railroad Iron and
Iron Ores.
Sole Agent for the MONOCACY FURNACE CO.
DEALER IN
MOSELEY, ROCKHILL, WARWICK,
And other Favorite Brands.
SILVER GREY IRON A SPECIALTY.

LANGHORNE WISTER. RODMAN WISTER.
L. & R. WISTER,
Brokers and Commission Mer-
chants in Iron, Steel, &c.
Office, No. 333 Walnut St., Philadelphia.

A. PURVES & SON,
Corner South & Penn Streets, Phila.,
Dealers in
Scrap Iron & Metals, Machinery, Tools,
Shaving & Pulleys, Steam Engines,
Pumps & Boilers, Copper, Brass,
Tin, Rabbit Metals, Foundry
Facings. Best Quality Ingot Brass.
Cash paid for all kinds of Metals and Tools.

J. J. MOHR,
Iron Commission
Merchant,
No. 430 Walnut Street, Philadelphia.
Sole Agent for the Sheridan and Leesport Furnaces.

BRADLEE & CO.,
Empire Chain Works,
Keystone Horse Shoe Co.
816 Richmond St., Philadelphia, Pa.
Manufacturers of all kinds of Chains. Also
of the Keystone Patent Solid Calk Horse
and Mule shoes.
These shoes are made of superior iron, com-
pletely finished and ready for cold shoeing;
have calks and clip. The holes are punched
through at the proper angles and free from
burrs. Same number of Shoes per keg as in
kegs of unfinished shoes.

John Carver,
MANUFACTURER OF
CAULKING IRONS,
Cotton, Freight and Hay Hooks,
No. 44 North Third Street,
Near First, BROOKLYN, E. D.

two prices—one for the goods to be con-
sumed in England, and another and lower
price for those that were to go abroad, and
the manufacturer's profits were made up on
the average price of the goods sold at home
and those sold abroad.

There is gambling in trade as well as in
stocks. Our tariff checks, if it does not en-
tirely prevent this, at least so far as for-
eign competition is concerned, and enables
our small capitalists freely to enter, with
their limited means, our markets, and be-
come domestic competitors where they would
not—indeed, dare not—if exposed to the
large foreign capitalists. It is our policy to
encourage these and all such, for every
one who starts in this way helps to cheapen
the article produced, while he increases our
home market for our agricultural products,
and assists in creating and accumulating
capital here at home, and in this way, in
increasing our national wealth.

PRICE AND NOT THE BALANCE OF TRADE
THE CONTROLLING AGENT.

There is another point to which I must call
your attention, an error which most of you
Englishmen fall into when discussing this
matter with our people, viz.: That what
you buy from us, depends on what we pur-
chase or take of you. In other words, if
we do not purchase your manufactured
goods you will not buy agricultural products
from us. Our friend, Thomas Bayley Potter,
in his recent visit to this country fell into
this error, and in almost all of his speeches
laid great stress upon it. He told our peo-
ple in substance that this result would follow
if we persisted in retaining our tariff. Now
there never was a greater fallacy. You,
like all other sensible people, buy where you
can buy cheapest, and sell where you can
obtain the best price for what you sell. If
you can buy your grain and breadstuffs in
Russia cheaper than you can in America,
you buy them there; if, on the other hand,
we can sell to you at a cheaper rate than
Russia, you buy of us. It is price that regu-
lates and controls, and not the balance of
trade between the two countries. Do you
suppose that any grain dealer in England
ever looks to see whether the balance of
trade is for or against his country
when he is about to make a purchase?
He buys wherever he can obtain the grain
for the lowest price. As proof of this
take the trade of your own country,
with Russia for the last 20 years. There
has not been one single year during this pe-
riod in which you have not purchased of her
greatly in excess of (and in most years more
than double in value) what she has bought of
you. Take the year 1878, the last for
which you have made up the figures, and
they stand as follows: Your imports from
Russia were £17,808,752, and your exports
to Russia £9,458,729; and for the year be-
fore (1877) your showing is still worse; you
imported from her £22,142,422, while you
exported or sold to her only £6,243,973—
less than one-third of what you imported.
Your trade with Russia for the last 20 years
was in the aggregate as follows: Your im-
ports were £369,782,059, and your exports
£158,436,122. In other words, you buy of
Russia more than double what she buys of
you. And if you will examine the statistics
of your trade with other foreign countries
you will find the same results. The same
inequalities exist as in your trade with
Russia—proving what I have said, that
what you buy of a nation is not dependent
upon what she buys of you; that it is price
and not the balance of trade that regulates
and controls the business you do.

A RADICAL DIFFERENCE BETWEEN ENGLAND
AND AMERICA.

In the discussion of the question of pro-
tection and free trade your people do not
take into consideration the difference be-
tween our country and yours with regard to
land and population. You have a scarcity
of land and a redundancy of population, and
in consequence cannot raise sufficient food
to feed your people.

We in the United States have a redundancy
of land and a scarcity of population, and in
consequence cannot only raise sufficient food
to feed our own people, but a very large sur-
plus for export. There is scarcely one ar-
ticle of food that you can raise or produce in
sufficient quantity to supply or feed your
own people, while with us, there is not one
of the staples which we cannot raise in
abundance, and with a large surplus. Of
course I do not mean to include in this cat-
egory articles of foreign production, such as
tea and coffee, but domestic articles and in
most instances those common to both coun-
tries. It is admitted that your agricultural
production varies in quantity in different
years; a good harvest yields more than a
bad; but there is no year when you produce
sufficient to feed your people. You do not
and cannot raise enough. Now let us look
at this a moment, and see to what extent
this deficiency exists, and we will take as an
example the year 1878, which is not an ex-
ceptional one. You paid during this year as
follows for the following articles:

Cattle, calves, sheep and lambs, alive...	27,323,606
Meat, including beef and pork, &c.....	12,838,899
Butter.....	9,934,033
Cheese.....	4,966,686
Birdstuffs, including corn, flour, wheat, &c	59,064,875
Eggs.....	2,511,096
Fish.....	1,541,839
Lard.....	1,757,574
Potatoes.....	2,386,143
Rice.....	3,000,843

Total.....£105,484,995
This table shows, for the 10 articles above
named, in our money, over £10,000,000.
Now, this being your condition, and since
you have every year to buy these staples and
indispensable articles of food, it is your in-
terest to get them as cheaply as possible;
hence your policy is to induce other nations,
including the United States, to devote them-
selves to agricultural pursuits; for the more
foreign nations you can persuade to engage
in this industry the cheaper the food will be
which you are compelled to buy, and to this
extent you are, or will be, the gainers by the
operation.

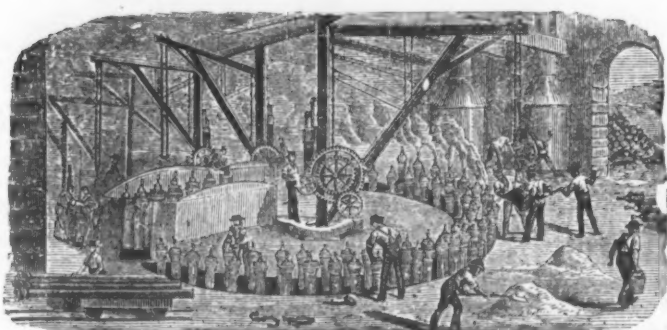
ENGLAND'S SEARCH FOR GOOD MARKETS.

But you not only want cheap food to feed
your people, you also want good or dear
markets in which to sell your manufactured
commodities. Now, if you can induce the
United States or any other country to give
up manufacturing and devote itself to agri-
cultural pursuits, you not only thereby to this

McNEALS & ARCHER,

BURLINGTON, N. J.

Flange Pipes.



General Foundry Work.

CAST IRON PIPES

FOR WATER AND GAS.

ESTABLISHED IN 1848.

SINGER, NIMICK & CO.,

PITTSBURGH, PA.

MANUFACTURERS OF ALL KINDS OF

HAMMERED AND ROLLED

STEEL,

Warranted Equal to any Produced.

BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives, Cold-Chisels and Machinists' Tools generally.

SAW PLATES

For Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

Sheet Steel

For Springs, Billet Web and Hand Saws, Shovels, Cotton Gin Saws, Stamping Cold, &c., &c.

SIEMENS-MARTIN (Open-Hearth) PLATE STEEL

For Boilers, Fire-Boxes, Smoke Stacks, Tanks, &c.

All our Plate and Sheet Steel being rolled by a Patented Improvement is unequalled for surface finish and exactness of gauge.

ROUND MACHINERY CAST STEEL

For Shafting, Spindles, Rollers, &c., &c.

File, Fork, Hoe, Rake, E. B. Frog, Toe-Calk, Sleigh-Shoe and Tire Steel, &c.; Cast and German Spring and Plow Steel.

"Iron Center" Cast Plow Steel. Finished Rolling Plow Coulters with Patent Screw Hubs attached. Agricultural Steel cut to any pattern desired. Steel Forgings made to order.

Represented at 59 BECKMAN ST., NEW YORK, by HOGAN & BURROWS, Gen'l Agents for Eastern and New England States.

MIDVALE STEEL WORKS,

CRUCIBLE AND OPEN HEARTH STEEL.

TIRES AND AXLES

OF EVERY DESCRIPTION.



TOOL, MACHINERY AND SPRING STEEL CASTINGS AND FORGINGS.

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WAREHOUSE:
12 N. 5th St., Philadelphia, Pa.

ESTABLISHED 1847.

A. WHITNEY & SONS,

PHILADELPHIA,

CHILLED RAILROAD WHEELS

For every kind of service, including Street, Mine and Lumber Tramways. Wheels furnished in rough bored or on axles. Chilled castings made to order.

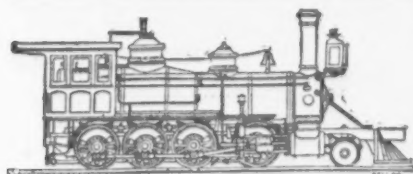
PENNSYLVANIA STEEL COMPANY,

Steel Rails, Frogs, Crossings & Switches.

Forgings for Piston Rods, Guide Bars, Wrist Pins and Machinery Purposes.

Works at Baldwin Station, Pennsylvania Railroad, near Harrisburg, Pa.

Address all orders to PENNSYLVANIA STEEL COMPANY, 208 South Fourth Street, Philadelphia.



BALDWIN LOCOMOTIVE WORKS,

BURNHAM, PARRY, WILLIAMS & CO., Proprietors,
Philadelphia, Pa., U. S. A.,

LOCOMOTIVE ENGINES

of every Description.

Catalogues, photographs and estimates furnished on application of customers.

NOISELESS STEAM MOTORS,

For city and suburban Railways.



These machines are nearly noiseless in operation; show no smoke with the use of anthracite coal or coke as fuel, and show no steam whatever under ordinary conditions of service. They can be run at two or three times the speed of horse cars and draw additional cars. Circulars with full particulars supplied.

CHROME STEEL WAREHOUSE.

Address JOHN W. QUINCY, Manager, 98 William St., N. Y.

This Steel is made from Chromium and Iron, and is remarkable for Strength, Durability and Uniformity. Send for Circular, where the proof will show it does 25 to 75 per cent. more than other cast steel. It is adapted to all kinds of work where cast steel is used. Chrome Steel Castings from 25 to 500 lbs. to order.

Southern Advertisements.

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Manufacturers of and Dealers in

Pig and Railroad Iron.

CHATTANOOGA, - - - - - TENN.

S. B. LOWE, Chattanooga, Tenn.,

DEALER IN

PIG IRON, IRON ORES AND FURNACE COKE.

LIGHT GRAY IRON CASTINGS

MADE A SPECIALTY BY

TAYLOR & BOGGIS,

65 to 73 Central Way,

CLEVELAND, OHIO.

Having extensive machine shop connected with foundry, we are enabled to fit up all kinds of light Hardware or patented articles. Correspondence solicited.

IRON AND STEEL DROP FORGINGS

All shapes, small and large, including

Gun, Pistol, Wrench Bars, &c. Also, Die Sinking. Manufacturers also of Bricklayers', Moulders' and Plasterers' Tools, Saddlers' Round and Head Knives.

WILLIAM ROSE & BROS.,

36th & Filbert Sts., West Philadelphia.

RICHARD P. PIM, Wilmington, Delaware,

MANUFACTURER OF

REFINED AIR FURNACE MALLEABLE IRON, IMPROVED PROCESS,

And LIGHT GRAY IRON CASTINGS. Castings of Best Quality made to order at short notice.

BRITTON IRON AND STEEL CO.,

MANUFACTURERS OF

BOILER, TANK AND BRIDGE PLATES,

Galvanized and Black Sheet Iron.

Foot of Wason Street, CLEVELAND, OHIO.

JACKSON IRON COMPANY,

Manufacturers of Fayette Pig Iron (L. S. Charcoal), Stewart Pig Iron (Bituminous Coal and Coke), Also, Hammered Blooms, Billets and Muck Bar, extra low in phosphorus, for Siemens Martin and Crucible Steel. Mined of Jackson (Lake Superior) Iron Ores. FAYETTE BROWN, Gen. Agent, HARVEY H. BROWN, Asst. Gen. Agent, Offices, 130 Water St.

HARVEY H. BROWN & CO.,

AGENTS

CHAMPION IRON CO., LAKE SUPERIOR IRON CO.,

Dealers in Pig Iron, Iron Ores and Old Rails.

Offices, 130 Water Street, - - - CLEVELAND, OHIO.

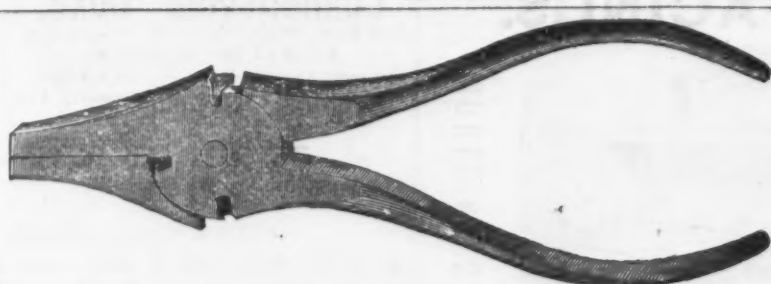
IRON ORES

C. E. BINGHAM & CO.,

Agents for the Sale of

Lake Champlain, Lake Superior and Canada Iron Ores and Pig Iron,

CLEVELAND, - - - OHIO.



J. M. KING & CO.,

WATERFORD, N. Y.,

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Specially Adapted for Use on Wire Fence.

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Wrought Iron and Brass Machine Screws; Turned, Hexagon Round and Square Head Cap and Set Screws; Brass and Iron Safety and Jack Chain; Gilt, Nickel Plated and Bronze Trimmings of all kinds, from Sheet Iron, Steel or Brass.

Estimates on patented articles, or any description of Sheet Metal work, respectfully solicited and promptly given.

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Rockwood, Tenn.

Miner and Contractor of Fossiliferous Ores.

A superior article delivered at low figures at any point on the Ohio River. Refer to Roane Iron Co., Chattanooga Iron Co., or S. B. Lowe, Chattanooga.

CAMPANIL IRON ORE,

SOMOROSTRO MINES.

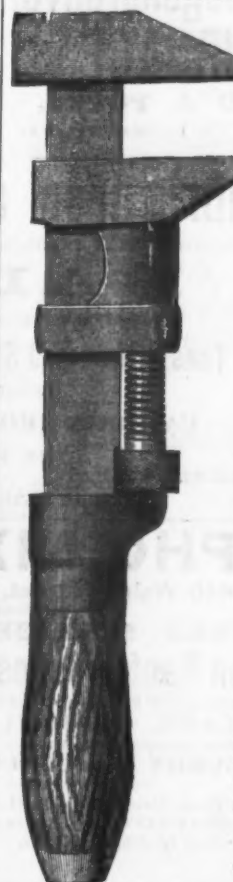
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15 DEY ST., New York.

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WARRANTED.



FOR

STRENGTH

AND

Durability

IT HAS

NO SUPERIOR.

GUARANTEED

IN

EVERY RESPECT.

Wrought Bar, Head

and Screw.

Owing to the in-

creased demand

for these justly

Popular Wrenches,

we are now manu-

facturing more than

any other establish-

ment in the world.

Our Wrench hav-

ing been imitated by

other manufactur-

ers, we have adopt-

ed the above Trade

Mark, and will here-

after stamp all our

goods.

SEND FOR

TERMS and PRICES.

GIRARD WRENCH MFG. CO., Girard, Pa.

A. Garrison. J. H. Rickerson. Wm. Holmes

PITTSBURGH FOUNDRY.

A. GARRISON & CO.,

Manufacturers of

Chilled Sand and Patent Homogeneous Steel

ROLLS,

Both Solid and Hollow,

Ore and Clay Pulverizers, Rotary Squeezers, Haskin's Patent Double Spiral Pinions, and Rolling Mill Castings of every description.

OFFICE, 6 Wood St., - - - PITTSBURGH.

Bridgewater Iron Co.,

Bridgewater, Mass.,

Manufacturers of

SEAMLESS DRAWN

COPPER AND BRASS TUBES,

TACK PLATES,

Forgings of every description.

Bridgewater Iron Co.'s

HORSE NAILS.

PRICE LIST.

No. 100 5 6 7 8 9 10

Per lb. 25¢ 28¢ 31¢ 34¢ 37¢ 40¢

Liberal discounts to the Trade.

73 Pearl Street, New York.

28 Broad Street, Boston.

The Iron-Masters' LABORATORY.

Exclusively for the

Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags and Coal for Practical Metallurgical Purposes.

No. 339 Walnut St., Philadelphia. J. BLODGET BRITTON.

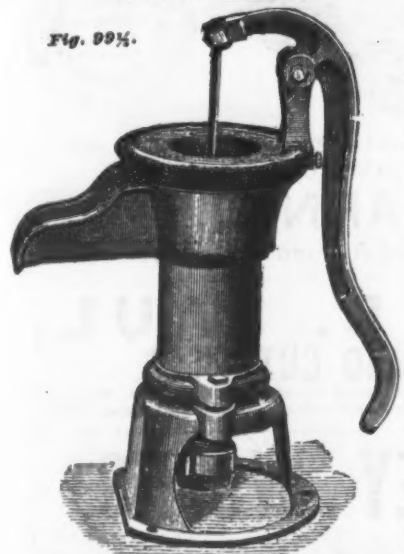
This laboratory was established in 1866, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

CHARGES TO IRON WORKS.

For determining the per cent. of Pure Iron in an ordinary Ore	\$4.00
For the per cent. of Pure Iron, Sulphur and Phosphorus in do.	12.50
For each additional constituent of usual occurrence	1.50
For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances.	
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For each additional constituent of usual occurrence	5.00
For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone, or each additional constituent	10.00
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Printed instructions for obtaining proper average samples for analysis furnished upon application.	

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GOOD AGENTS WANTED
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The Largest Pump Works in the World.
OVER 800 DIFFERENT STYLES.
**PUMPS, STEAM PUMPS, ROTARY
PUMPS, CENTRIFUGAL PUMPS,
PISTON PUMPS,**
for Tanners, Paper Mills, Fire Purposes, suitable for
all situations imaginable.



Also, **HAND FIRE ENGINES.**
Send for Catalogue. Address
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**IRON WIRE, SIEVES AND
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Power Loom Painted Screen Wire Cloth,
GILBERT'S RIVAL ASH SIEVE,
Galvanized Twist Wire Netting,
THE UNION METALLIC CLOTHES LINE WIRE,
Warehouses, - 49 Cliff St., New York.



Full Size of Second Class Brass.

JOHN STARR,
Hardware & Metal Broker,

AND
MANUFACTURERS' AGENT,
Halifax, Nova Scotia,

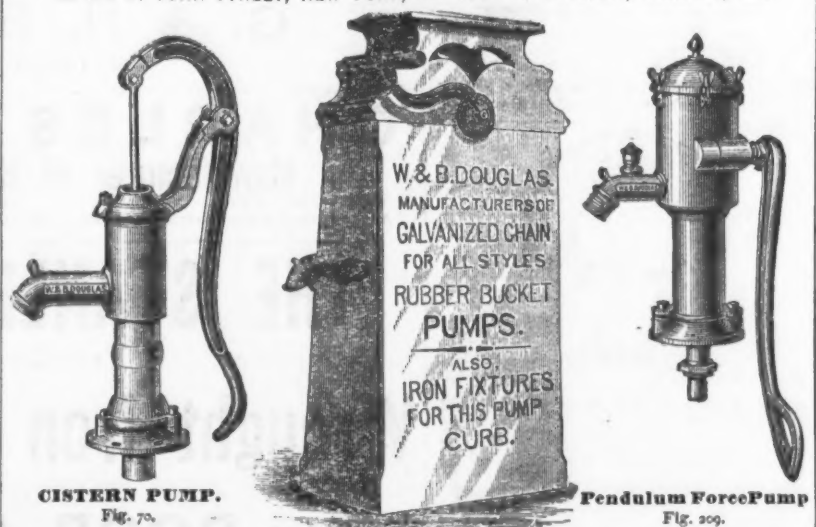
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American Manufacturers, is ready to accept
further Agencies. Satisfactory references.

AXLES
All kinds Wagon & Carriage Axles
Manufactured by the
LANBERTVILLE IRON WORKS.
LANBERTVILLE, N. J. Send for prices.

W. & B. DOUGLAS,
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The Oldest and Most Extensive Manufacturers of
PUMPS, HYDRAULIC RAMS, GARDEN ENGINES
Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps
and other Hydraulic Machines in the World.

Awarded two **GRAND MEDALS** at **WORLD'S EXPOSITION**, Paris, France, 1875, being
the highest award on Pumps, &c.: also the highest medals at Paris, 1867, Vienna, 1873, and Philadel-
phia, 1876, accompanied by the Report of Judges.
Descriptive Catalogues and Price Lists sent when requested.

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85 and 87 JOHN STREET, NEW YORK, and 197 LAKE STREET, CHICAGO, ILL.



UNION MANUFACTURING COMPANY,
Manufacturers of all styles Plain and Ornamental Butts,
**LOOSE PIN REVERSIBLE,
Cast Fast & Loose,**
Drilled and Wire Jointed,
Japanned, Figured, Enamelled, Nickel Plated
and Real Bronze Butts. Also a full line of
IRON & BRASS PUMPS.
Cistern, Well and Force Pumps, Yard Drive Well,
Garden Engine and Steam Boiler Pumps, Hydraulic
Rams, etc., and all with the most modern improvements.



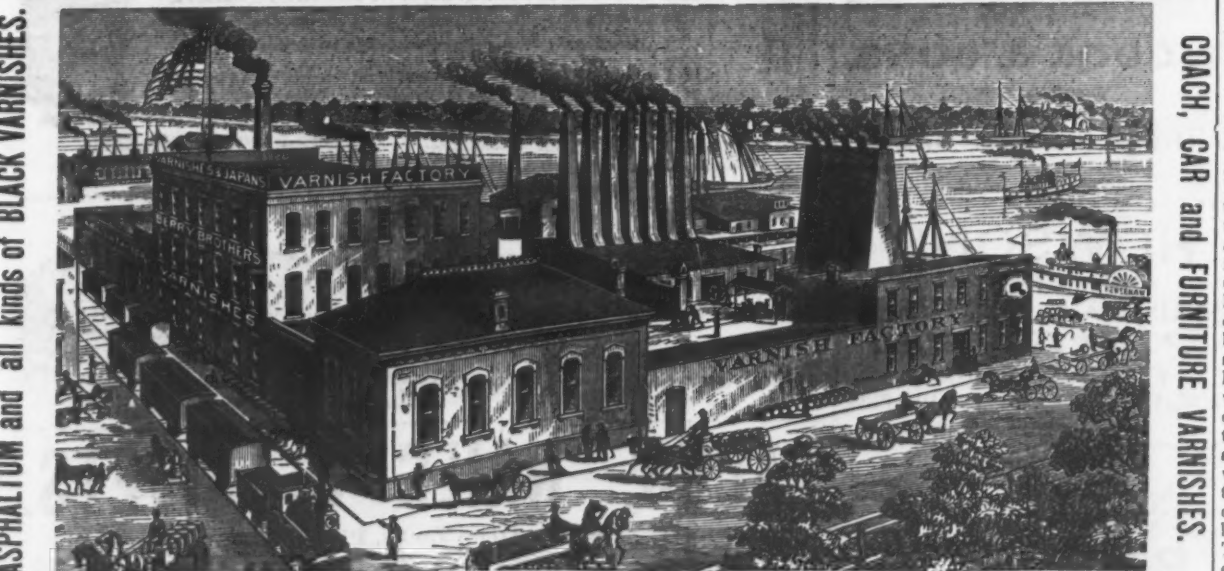
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We beg to call the attention of Architects, Builders,
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Spring Hinge, knowing it to be an effective and dur-
able one, neat in appearance, easy to put on, and not
liable to get out of order. The springs are made from
wire made expressly for us, and for this particular
purpose, with the view of great elasticity, durability
and power. They produce a continuous pressure
from the point where the door is wide open until it is
closed, and then hold it perfectly in position. It has
a solid pin in connection with short hollow ones,
causing little or no friction, the whole power of the
spring being exerted in swinging the door. It is fast
joint, and can be used for either right or left hand,
allowing the dealer to carry less stock, and the builder
will never get the wrong hand.
Fine Castings a Specialty.
NEW BRITAIN, CONN.
Warehouses:
98 Chambers St., New York.
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merce St., Phila. (Butts).
Send for Illustrated Catalogue and
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Pat. Brads, Finishing Nails, Clout Nails, Trunk Nails, Hungarian Nails,
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Carpet Tacks, Upholsterers' Tacks, Gimp and Lace Tacks,
Brush Tacks, Copper and Brass Tacks,
BRASS AND IRON ESCUTCHEON PINS, &c., &c.,
MANUFACTURED BY
DUNBAR, HOBART & WHIDDEN, So. Abington Station, Mass.
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West Lombard St.; PHILADELPHIA, 57 North Front St.; BOSTON, 141 Milk St.; NEW YORK, 279 Broadway.

extent cheapen the price of food, but you
accomplish another result, which also works
to your advantage—you check foreign com-
petition and create another market for your
manufactured products. You are doubly
benefited and must necessarily grow rich.
It is a gain to you on both ends of the stick.
You buy for less and sell for more. But
how is it with the nation that is weak
enough to be misled by such delusive argu-
ments? It loses all that, indeed more than
you gain, and if you thrive and grow rich
it starves and grows poor; and it requires
not much reasoning to demonstrate that
bankruptcy and ruin must soon follow if
this policy is persisted in.

We think we understand these questions
and what our true interest is so far as they
apply to our people and our country, and we
do not regard ourselves as benighted be-
cause of the policy we have adopted, or be-
hind any other country in the world, even
England, in civilization and progress. In-
deed, we look with great satisfaction, if not
pride, upon the rapid advance we have
made as a people, and as a nation, in popu-
lation, wealth and intelligence, and think that
history, either ancient or modern, does not
show a parallel example.

You will permit me to say in conclusion,
that we attribute no small share of this pro-
gress and development to the American
system of Protection in contradistinction to
your so-called system of Free Trade.

Very truly yours, **THOMAS H. DUDLEY.**

METALLURGICAL NOTES.

RELINING A BLAST FURNACE WITHOUT BLOWING OUT.

An interesting account of the repairing of
a blast furnace is described by the *Oestr.
Zeitschrift f. Berg. u. Hüttenwesen*. In the
early part of 1878, No. 1 furnace, at the
works of the Bochum Verein, was found to
be extensively damaged in the upper part of
the stack from the action of the gases, and
it was decided to remove the lining nearly
down to the level of the boshes, and replace
it with a new one of small bricks. The fur-
nace, which is 72 feet high, 21 feet diameter
in the boshes, and had been blowing for two
years, was not put out of blast, as the hearth
and boshes were in good condition, but would
probably have required replacing if they had
been allowed to grow cold; and also the de-
lay would have been considerably greater
than actually took place, the repairs having
been executed in 12 days. At the time of
the stoppage the furnace was on Bessemer
pig iron, and, in order to expedite the cool-
ing, the burden on the last day was reduced
to one containing only 25 per cent. of iron.
The other materials being so proportioned
as to give a tolerably fusible slag. The
final eight charges consisted of 2 1/2 tons
of coke and 9 tons of gray slags.
The furnace was then allowed to work
down until a depth of 40 feet below the shaft
was emptied. At the last cast very little
iron was obtained, but it was accompanied
by a large quantity of black and glassy slag.
About 10 tons of gray metal slags which fall
to powder when cooled were next charged
upon the top of the column of materials in
the shaft. This was in places at a low red
heat, with the coke glowing brightly, and
the charging bell was lowered on to the top
of it. Eight holes were then cut through
the walls of the furnace, with a view of
expediting the cooling by the influx of cold
air. The effect produced was, however, the
reverse, as the combustion of the coke be-
came more active when the air was admitted;
the holes were therefore closed up again,
and a further quantity of powdered slags
was introduced, until the covering was from
1 to 2 feet thick, when the temperature at
the tunnel head became quite bearable. A
sheet-iron funnel with a long tube 15 inches
in diameter was next introduced into the
empty space, to one end of which were three
Korting's exhausters, each supplied with
steam by three 1/2-inch jets, for the purpose
of removing the furnace gas and supplying
fresh air, an arrangement that was perfectly
successful in practice. The damaged brick-
work, as it was broken away, was removed
by five windlasses at the furnace top, each
worked by four men, one of whom filled the
materials lifted into barrows and removed
them to the lift. From eight to ten men were
employed in the furnace, and they did not
experience any inconvenience or discomfort
from heat, or bad air, this part of the work
being preferred to that at the furnace top.
From 3 1/2 to 6 1/2 feet in height of the lining was
removed per shift. Below 8 feet from the
furnace top the men worked upon a sus-
pended staging, which was lowered progres-
sively; subsequently two holes, of about 10
square feet area, were made in the furnace
wall, and two plates of the iron jacket were
removed at the depth of 40 feet from the top,
so that the materials could be got rid of
without the necessity of lifting them through
the whole height of the furnace. The new
lining was carried out with small bricks in
the ordinary way of walling, and was fin-
ished in ten shifts. In filling the furnace
when the repairs were completed, the bell
was lifted about 7 feet at a time, and the
space charged from baskets by hand until
the column was within 20 feet of the top,
when it was replaced in its proper position
and the ordinary method of charging from
barrows was resumed. When the blast was
turned on and the smelting recommenced,
the charges went down regularly without
any sign of scaffolding. In eight days the
furnace had resumed the full make of 50 to
60 tons per shift. The damage done to the
lining by the gases was first perceived at a
depth of 20 feet from the top, where the
bricks became rotten and brittle, and were
scoured out by the descending charges into
large holes, one of which, at 20 feet depth,
was 6 1/2 feet across. Lower down the section
of the stack was fairly well preserved, but
the bricks were completely rotten except for
an outside portion of from 2 1/2 to 4 inches,
which remained sound. The damaged por-
tions were covered with innumerable cir-
cumferential cracks, as though they had
been split by forces acting from the inside.
The color was bluish gray, and the interior
cavities were filled with concretionary sub-
stances varying from the size of a pea to
that of a bean. The furnace is still in blast,
and working satisfactorily, a long period
having elapsed since the repairs were made.

DEPHOSPHORIZATION OF IRON THEORETICALLY CONSIDERED.

No writer on the dephosphorization of iron
and the improvements of the last few years
has so fully grasped the questions at issue, and
so clearly pointed out the difficulties attend-
ing upon the new process, as Herr Josef Gängl
von Ehrenwerth, of the Leoben School of
Mines. In a series of articles contributed to
the *Oestr. Zeitschrift f. Berg. u. Hüttenwesen*,
now issued in pamphlet form, he has closely
followed progress, and, based upon a pro-
found and thorough knowledge of the Besse-
mer process, he has, from theoretical con-
siderations and calculations, drawn practical
conclusions which later experimental
work has borne out. Herr von Ehren-
werth's brilliant record on this question is a
striking instance of the importance of what
many consider abstruse scientific questions.
Though much credit is due to the managers
of the Hoerde Works, who have done so
much by showing that silicon may be re-
placed by phosphorus for the generation of
the heat necessary for the completion of the
Bessemer process, there can be no doubt
that priority is justly claimed by the Aus-
trian professor. On the 23d of May he
pointed to the possibility of such replace-
ment, and on the 30th of July he published
an elaborate essay in which he went over
the whole ground, developing his theory
scientifically and pointing out the practical
features which it suggested. Later, toward
the end of September of the same year, the
Hoerde experiments, which so rapidly led to
unexpected results, were begun. The idea
that phosphorus, the dreaded foe of steel,
should actually be used to generate the heat
required to keep the steel in a fluid condi-
tion during the Bessemer process, will ap-
pear so startling that a summary of the
theoretical points involved may be of gen-
eral interest.

We need not follow Herr von Ehrenwerth
in his demonstration of the fact that lime
alone is better as an addition to the metal
than a mixture of lime and oxides of
iron, because metallurgists, both in Eng-
land and on the Continent, some time since
abandoned the use of a mixture. The quan-
tity of lime necessary for any given com-
position is found in the following man-
ner: Experience thus far has taught that
the silicon in the cinder produced must not,
in order to retain the necessary amount of
phosphoric acid, go beyond 14 per cent.,
while a safe saturation of the cinder with
phosphoric acid is reached at 12 per cent. of
the latter substance. Assuming that 8 per
cent. of iron and manganese are carried into
the cinder by 2 per cent. of silicon, it is
found that one kilogram of silicon yields
7.286 kilograms of cinder. Designating s
as the quantity of silicon in the pig, p the
phosphorus, k the lime to be added, r the
quantity of silicon in the final cinder, as-
sumed to be 14 per cent., and q the per-
centage of phosphoric acid in the cinder,
we have the following formula: $100 m k +$
 $2.143 s = 14 (7.286 s + k + 3.452 p)$. In
this formula 3.452 p represents the amount
of phosphate of iron produced by the com-
bination of the phosphorus of the pig, and
 m is the percentage of silica in the lime
added. Developing this formula for k and
substituting 5 for 100 m , we have:

$k = 12.48 s + 5.37 p$.
This would yield for pig holding 1.5 per
cent. of phosphorus, like the Cleveland
metal, the following amounts for per-
centages of silicon:

Silicon	1.5	2.5	3.5
Lime	4.33	10.76	16.94

It is necessary, however, to examine
whether the cinder produced conforms to
the second condition, that of containing less
than 12 per cent. of phosphoric acid. The
following equation, in which q is the per-
centage of phosphoric acid in the cinder, will
serve to check the figures obtained by use of
the first figure:

$$2.25 p = \frac{q}{100} (7.286 s + k + 3.452 p)$$

Both these formulas must be used when-
ever the amount of lime is to be calculated,
the higher figure obtained being used. In
estimating the comparative calorific value
of silicon and phosphorus, Herr von Ehren-
werth takes the latter at 4500 units per unit
of oxygen, according to Andrews. Burn-
ing in air, 3.35 parts of nitrogen must be
heated to 1400° C., the temperature of
the gases escaping from the converter, thus
diminishing the quantity by 1144 units, so
that for every unit by weight of oxygen

$$4509 - 1144 = 3365$$

3365 units of heat are generated in the bath
of metal. Reducing this to one unit by weight
of phosphorus (44.44 parts of phosphorus
require 55.56 parts of oxygen in order to
form phosphoric acid) we have

$$3365 \div 55.56 = 4206 \text{ units.}$$

Now, as 1 unit of silicon generates 7830—
1307 = 6523 units, phosphorus and silicon
may replace one another in the proportion
of 4206 to 6523, or one part of phosphorus
is, as far as calorific value is concerned,
equivalent to 0.645 parts of silicon, or one
part of the latter is equivalent to 1.55 parts
of phosphorus. On the basis of these
figures, pig holding the following amounts
of the two elements would be equivalent as
regards the temperature generated, the first
series corresponding to Bessemer pig holding
2 per cent. of silicon, the second metal con-
taining 1.50 per cent.:

First Series.

Si	0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
Pb sp. r. 8	3.12	2.73	2.33	1.95	1.56	1.17	0.78	0.39	0.00

Second Series.

Si	0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
Phosphorus	2.33	1.95	1.56	1.17	0.78	0.39	0.00	0.00	0.00

If the amount of iron and manganese
carried into the cinder be taken into ac-
count, 1 part of silicon will be equivalent to
1.7 parts of phosphorus, or 1 part of the
latter will be replaceable by 0.59 per cent. of
silicon.

Herr von Ehrenwerth enters into an elab-
orate calculation of the temperature of the
process, taking into account the initial tem-
perature of the pig and the cooling effect of
the basic additions. We cannot follow him
in his deductions, but trust that the follow-
ing table, the result of his labors, may be
found of interest. The figures having an
asterisk refer to the production of a cinder
containing less than 12 per cent. of phos-
phoric acid, but 14 per cent. of silica. Δ

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Paris, 1878.


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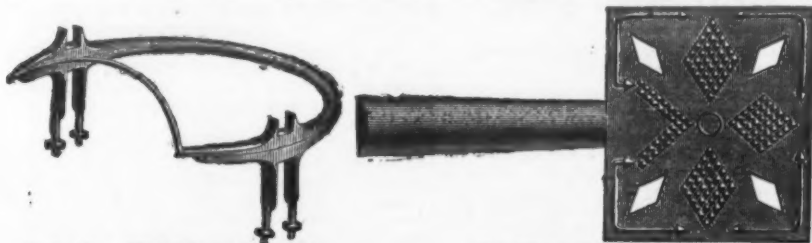
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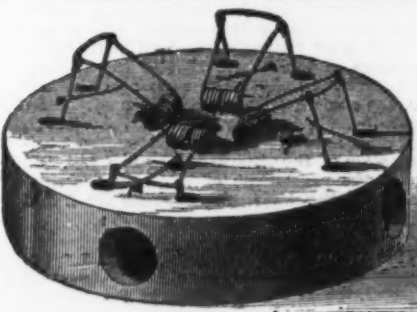
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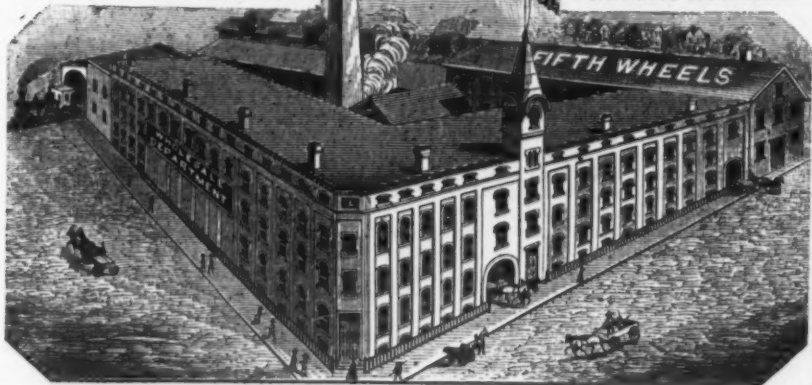
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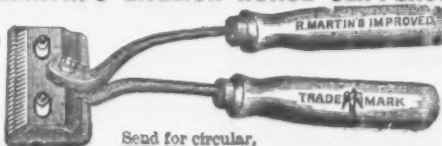
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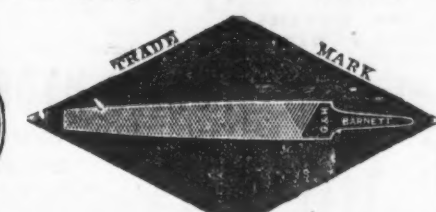
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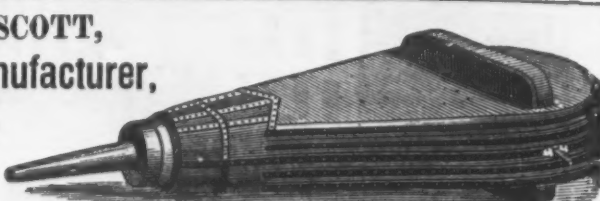
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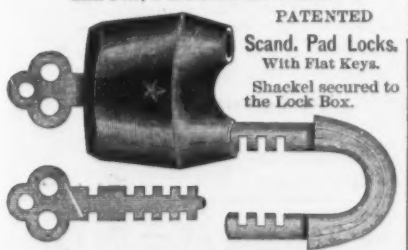
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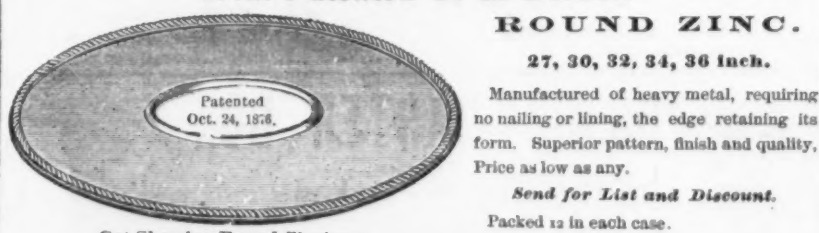


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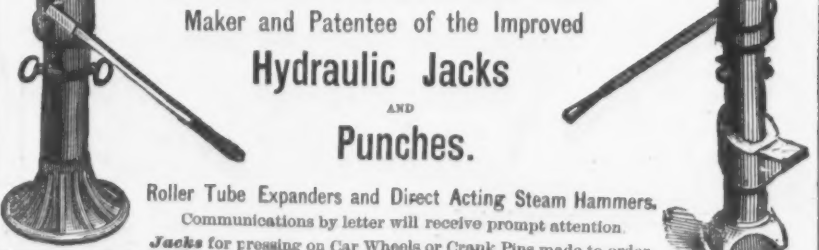
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No. 24 Columbia Street, New York,
Maker and Patentee of the Improved
Hydraulic Jacks
AND
Punches.



Roller Tube Expanders and Direct Acting Steam Hammers.
Communications by letter will receive prompt attention.
Jacks for pressing on Car Wheels or Crank Pins made to order.

EVERY
PUTNAM NAIL
is drawn down to a point from the rod, thus:
It is the only Hot Forged and Hammer Pointed Horse Shoe Nail, made by ma-
chinery, in the World.
Some other manufacturers claim to make a hot forged Nail, but you will observe on all such a
sheared edge near the point.
P. O. Address, Neponset, Mass., U. S. A.

those figures in one line to the right of the
asterisk yield a cinder containing 12 per
cent. of phosphoric acid but less than 14 per
cent. of silica, the cinder being very favor-
able to a complete dephosphorization. We
have omitted from the original table all
cases requiring more than 25 per cent. of
additions. The first group of four refers to
pig melted at a high temperature (1400° C.),
the second to pig moderately hot (1300° C.):

Temp. of Pro- cess, deg. C.	Phosphorus, per cent.	Silicon, per cent.	Iron, per cent.	Manganese, per cent.	Carbon, per cent.	Aluminum, per cent.	Calcium, per cent.	Magnesium, per cent.	Sulfur, per cent.	Phosphorus, per cent.	Silicon, per cent.	Iron, per cent.	Manganese, per cent.	Carbon, per cent.	Aluminum, per cent.	Calcium, per cent.	Magnesium, per cent.	Sulfur, per cent.
1400	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
1300	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
1200	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
1100	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
1000	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
900	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
800	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
700	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
600	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
500	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
400	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
300	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
200	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01
100	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01	0.12	0.12	1.00	0.05	0.25	0.01	0.01	0.01	0.01

The table well illustrates the range within
which the Thomas and Gilchrist process is
available, under the conditions that the
cinder produced must not contain more than
12 per cent. of phosphoric acid nor 14 per
cent. of silica. When the amount of phos-
phorus is low, and therefore the silicon must
be high, the latter condition leads to extrava-
gantly large additions of lime, which in
their turn require a high temperature, call-
ing for a large percentage of silicon in the
pig. The question is whether such a class
of metal may be worked in some other man-
ner. The quantity of cinder necessary to
absorb all phosphorus until a maximum of
12 per cent. of phosphoric acid is reached, is
expressed as follows:

$2.25 p = 18.75 p$
 $0.12 p = 18.75 p$
Now, the cinder is produced by the combus-
tion of silicon, phosphorus, iron, manganese
and by addition of lime, being therefore:
 $7.286 s + 3.452 p + k = 18.75 p$
which will yield:

$s = 2.10 p - 0.137 k$
But as the cinder must not contain more
than 14 per cent. of silicon, we have:
 $k = 12.48 s - 5.37 p$
Combining both formulae, we have:
 $s = 1.048 p$
 $k = 7.71 p$

Therefore, in order to produce so much cin-
der holding 14 per cent. of silica that it con-
tains only 12 per cent. of phosphoric acid,
we must not let more than a quantity of silic-
on approximately equal to the phosphorus
present enter into the cinder, while 7.7
times the quantity of phosphorus will give the
amount of lime to be added. This applies to
all grades of pig which contain about 1.25 per
cent. of phosphorus or less. There are two
methods of arriving at this result, the first
being the use of a preliminary converter, de-
signed to carry the silicon to the required limit
by a short blow, which is followed by working
in a second converter with the use of addi-
tions of lime. Under the conditions given, it
seems, however, as though the Ponsard
ferro-convertisseur is a better apparatus,
because it is necessary to depend upon a
sufficient quantity of silicon in order to be
able to produce the temperatures required.
Herr von Ehrenworth suggested that it
would be best to add a little siliceous pig
in the beginning, and run the temperature
as high as possible, to tap the cinder and to
finish the blow with the aid of lime. He at-
taches much importance to the value of the
Ponsard furnace in working phosphoric pig
for very high grades of steel, especially as it
permits the use of hot blast, and allows of a
ready removal of the cinder previous to the
addition of ferromanganese or spiegel-
eisen.

THE COCKERILL CLASSIFICATION OF STEEL.

The famous Société Cockerill, of Sorsang,
Belgium, classify the steel made at their
establishment as follows: All steel contain-
ing from 0.05 to 0.20 per cent. of carbon is
graded as extra mild. It has a tensile
strength of from 25 to 32 tons per square
inch, and an elongation of from 20 to 27 per
cent. in 8 inch bars. This steel may be
welded, but does not temper, and is used
chiefly for girder plates, ship and boiler
plates, wire, nails, &c. The second class
embraces metal ranging in carbon from 0.20
to 0.35 per cent. It possesses a higher ten-
sile strength, from 32 to 38 tons per square
inch, but less ductility, the elongation being
15 to 20 per cent. It hardens little and can
scarcely be welded, and is the material from
which the Cockerill Works make some of
their rails, axles, tires and guns. The third
class, that of hard steel, is characterized by
a percentage of carbon varying between
0.35 and 0.50 per cent., a tensile strength
of 38 to 46 tons per square inch, and an elon-
gation ranging from 15 to 20 per cent. It
does not weld, but may be tempered. It is

used for rails, tires, springs, guide bars of
steam engines, spindles, hammers, &c. The
hardest steel, having a percentage of car-
bon varying from 0.50 to 0.68 per cent., is
capable of bearing a strain of from 46 to 51
tons per square inch, while it elongates only
from 5 to 10 per cent. in sample bars 8
inches long. It cannot be welded, but takes
a strong temper, and is for that reason used
for various cutting tools, files, saws and
delicate springs.

A NEW METHOD OF DESULPHURIZING AURIFEROUS PYRITES.

In the metallurgy of the precious metals
there is hardly a branch which has more oc-
cupied the attention of charlatans, as well as
of skilled metallurgists, as the question of
rendering auriferous pyrites accessible to the
ordinary methods of amalgamation. The
latter process, yielding, as it does, quick re-
turns at a low cost, becomes valueless when-
ever the gold in the ore is not in a free state,
and thus it is that when, in many mines, the
undecomposed ores below drainage level are
reached, only a very small part of the
precious metal in the ores can be extracted
with mercury in the ordinary manner. For
such ore amalgamation must be preceded by
some process by which the sulphur in the
ore is eliminated, and as the ordinary calcin-
ing and chlorinizing processes require deli-
cate management, a large plant and skilled
workmen, they are applicable only to rich
ores or concentrates. For many mines, and
for whole mining districts, the question of a
cheap desulphurizing process is, therefore,
a vital one. We have had occasion, recent-
ly, to examine a process which embodies fea-
tures that are likely to insure ultimate success.
Prominent among these are great simplicity,
and, therefore, low first cost. An experi-
mental plant is now in operation at the
works of the Manhattan Refining Company,
Jersey City, of which Mr. Walker, the in-
ventor of the new process, is the president.

The principle upon which it is based is the
following: The crushed ore is blown through
a long series of pipes at a red-heat, by means of
a mixture of air and steam. During its pas-
sage through these pipes, the sulphur of the
ore is oxidized, passing off as sulphurous
acid, while the fine desulphurized ore is al-
lowed to settle in a dust chamber. The gases,
which are still charged with some fine dust,
are passed through a water trap, which
washes them, so that any possibility of me-
chanical loss, by suspension of fine particles
in the gases, is precluded. At Jersey City
the plant consists of a charging hopper,
from which the ore is carried by a feeding
screw into a receptacle, where it meets with
the mixture of air and steam. The steam,
before coming in contact with the ore,
passes into an injector, which is also con-
nected with the air pipe. The air is now
supplied by a small compressor, which is
usually run up to 10 pounds, its pressure be-
ing, therefore, approximately equal to that
of the steam used. The current of air and
steam carry the fine ore into the 2 1/2-inch
wrought-iron pipe, which is heated in a
special furnace. The length of pipe exposed
is about 350 feet, made up in section, the
joints being in the middle of the longer
straight section, while an easy and gradual
bend makes up the shorter side of the re-
ctangle, the shape in which the pipe is
placed in the furnace. Mr. Walker's experi-
ence has been that the inner surface of the
pipe is rapidly coated with an adhesive crust
of magnetic oxide—a fact which will not ap-
pear astonishing to those who have followed
the progress of the Barff method of protect-
ing iron against rust, as the very conditions
described by Prof. Barff as necessary in the
production of a magnetic film, are complied
with in this case. The formation of such a
lining within the tubes is, of course, a very
favorable circumstance, as it will act as a
reliable protection against any corrosion
of the interior of the pipe, the dura-
tion of which will, therefore, depend
solely upon the rate at which it is
burnt by the gases of the fuel. The
choice of the latter will, therefore, be
of some importance, and, naturally wood, if
it can be readily obtained, will be most suit-
able. The rate of feeding the ore will nat-
urally depend, to some extent, upon its na-
ture, material higher in sulphur demanding
a larger volume of air and admitting only
of a slower feed. We are informed that the
capacity of the furnace now built is about 3
tons per day. It is thought that much more
can be obtained, and that it will be cheaper
to run poor ore and tailings through the
furnace in bulk than to dress it by mechani-
cal means and work the rich concentrates
obtained. Among the material experimented
with is some Haile Mine ore, running, ac-
cording to an assay made by Messrs. Cars-
ten, 1.4 ounces of gold, worth \$28.04. The
calcined ore was found by the same chemists
to hold 1.50 ounces of gold, worth \$31.60
per ton. By amalgamation test, 1.20 ounces,
or \$24.80, were extracted, so that about 80
per cent. of the gold contained in the sul-
phurates was rendered accessible, not count-
ing the amount probably lost during the
process of amalgamation. We may add
that the calcined pyrites were found to hold
5.03 per cent. of sulphur. As far as the pro-
cess has been developed the results obtained
are highly encouraging. The simplicity of
the plant, the absence of all expensive or
ponderous machinery, and the wide range
of capacity which it possesses, will commend
it to those who are struggling with rebellious
ores.

There is just now a furore for steam
yachts. The very latest is an iron steam
catamaran, an idea stolen from the South
Sea Islanders, to be built by parties in
Nyxack for Commodore Wm. Voorhies, of
yacht club fame. Such craft as the Grace
and Tidal Wave are not up to the times, and
the demand is now for a double hull with
double engines, all of iron, expected to make
a speed of 25 or 30 miles an hour. Her
length will be 105 feet. Mr. Beach, on the
Delaware, has orders for a splendid iron
yacht for Wm. Belden, of New York, and
the Cramps are building for New York parties
another of the same general description.
It is also reported that David Kirby is about
to build a steam catamaran at Rye, and a
steam yacht is spoken of as contemplated
by C. J. Osborn, N. Y. Y. C., but the paper
fleet is much larger this winter than the
fleet actually built.

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No. 49 Chambers Street, New York.



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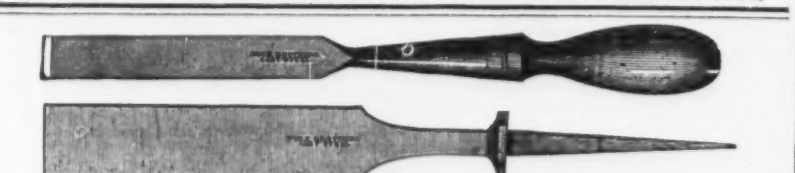


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It having come to the knowledge of
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Knives, purporting to be of his manufacture,
are being sold in the United States, he hereby
cautions all purchasers of his Knives and
Steels to be on the alert against such im-
position.
JOHN WILSON also hereby gives Notice,
that it is his determination to institute Legal
Proceedings against any person or persons who
may be detected infringing his Trade Mark.
Every article of JOHN WILSON'S manu-
facture, bears the Trade Mark, in addition to
the Name.

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Etc., Etc., Etc.

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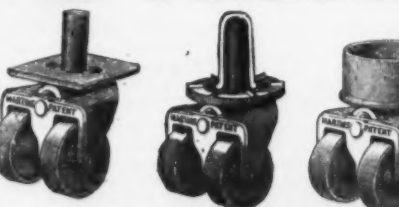
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4, 5 and 6 fingers.
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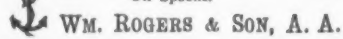
WM. ROGERS,
Senior Member and Manager of ROGERS BROTHERS.
On Knives.



F. WILLSON ROGERS,
Son of the late Wm. Rogers.
On Hollow Ware.



Our Knives are guaranteed to STRIP 12 dwts. of Silver per Dozen. All goods are put up in a box. All our Knives are put up in the latest and most attractive style, with guarantee card in every box.



Our Spoons, Forks, etc., are guaranteed to STRIP 48 dwts. per gross. On Tea Spoons, 48 dwts. per gross. On Dessert Spoons and Forks, 72 dwts. per gross. On Table Spoons and Medium Forks, 96 dwts. per gross.

ALL OTHER GOODS IN PROPORTION. All our Spoons, Forks, etc., are plated upon 18 PER CENT. NICKEL SILVER. The best base known for plating upon.



Our Hollow Ware is plated upon the FINEST WHITE METAL, and is guaranteed to be plated fully 50 Per Cent. More Silver than any other brand of goods in the market.

P. O. Address, Drawer 30.

WM. ROGERS & SON, Hartford, Conn.
Depot, No. 100 Chambers Street, New York.

HALL, ELTON & CO., Electro Plated Ware, German Silver and Britannia Spoons.



THE "EASTLAKE." (Patented.)

Factories, Wallingford, Conn.

Salesroom, 75 Chambers Street, New York.

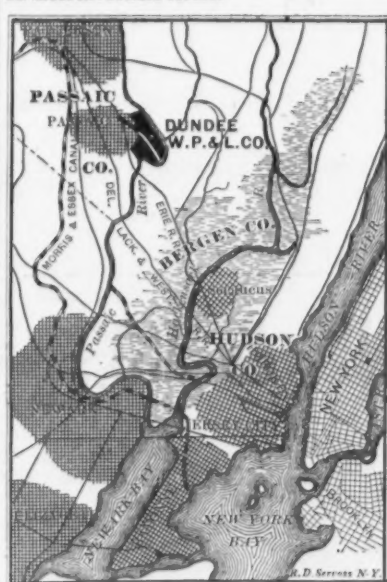


FORKS, SPOONS, Etc.,
Manufactured from Cast Steel, Plated with Nickel and Silver.

WALLACE BROTHERS, Wallingford, Conn.

VALUABLE MANUFACTURING SITES TO LET. The Dundee Water Power and Land Company, OF PASSAIC, NEW JERSEY.

Offer to manufacturers one of the most desirable situations for the establishment of manufacturing industries in the United States, on most favorable terms.

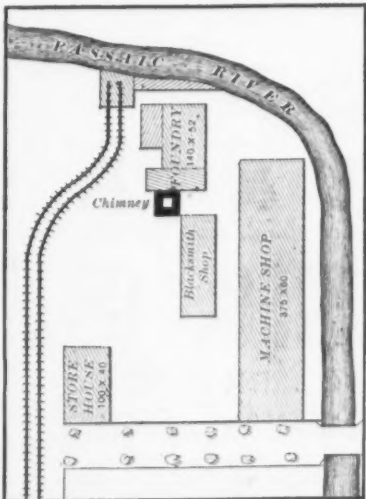


Map showing advantageous location of Passaic, N. J., as a manufacturing center.

The property of this company is located at Passaic, New Jersey, at the head of navigation of the Passaic River, only 12 miles from New York and 4 miles from Paterson. It is located directly on the line of the Erie Railroad. By means of a dam and canal, both constructed in the most permanent manner, the entire water power of the Passaic River is conducted to the company's mill sites, by which is obtained a fall of twenty-two feet. Competition by both river and rail insures the lowest rates of freight transportation, and the close proximity of several large manufacturing cities, viz: New York, Paterson and Newark, secures a great advantage in respect to labor. There is at present in operation a dozen manufacturing establishments, giving employment to a large number of hands. The location is perfectly healthy, cost of living is cheap, and there are good churches and excellent schools. Cheap illuminating gas and healthy city water are also to be had. The permanency of the mill water power is assured. The water is delivered to each mill through a canal 80 feet wide.

Among the manufacturing establishments at present located on this property are the New York Steam Engine Co.; Rittenhouse Manfg. Co., woolen mill; Messrs. Waterhouse Brothers; Beach & Sons, both woollens and socks; Reid & Barry; Passaic Print Works. The establishment of the New York Steam Engine Co. is now for sale owing to a dissolution of the company. The works comprise eight substantial one and two-story brick buildings, and consist of Manufacturing Shop, 375 feet by 50 feet; Foundry, 140 by 52 feet; Pattern Shop, 100 by 40 feet; Shop, 80 by 40 feet; Brass Foundry and Boiler Room, of about 20 by 20 feet each, together with additional smaller buildings, called the Power House, for 75-horse power turbine, and the Fire Engine House. These works are located directly on the Passaic River, with good depth of water. In every respect this location is particularly desirable for manufacturing purposes. Liberal terms will be made by the company with desirable parties. Full information will be furnished by mail or personally by application to

JOHN B. PUTNEY,
Sec'y D. W. P. & L. Co., PASSAIC, N. J.



Plan of the works of the New York Steam Engine Co., offered

THE HOWE SCALE CO., Improved Scales & Weighing Machines of every Variety.

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PAGE, FARGO & CO., 325 Broadway, New York. BORDEN, SELLECK & CO., 97 Lake Street, Chicago.
PAGE, FARGO & CO., 213 Market Street, Phila. J. FRED. DENNIS, 8 & 9 Holborn Viaduct, London.
PAGE, FARGO & CO., 63 Wood Street, Pittsburgh, Pa. Works at Rutland, Vt.



SCUTT'S
PATENT
Four Pointed Steel Barbed Cable Fence Wire,
Manufactured by H. B. SCUTT & CO., Buffalo, N. Y.

(See Monthly Iron Age.)

The National Association of Stove Manufacturers.

The chief business of the second day's session of the Stove Association was the reading and discussion of the following report of the Committee on Business:

The committee appointed to report upon the suggestions contained in the address of our president, and to report subjects for the consideration of this meeting, respectfully present the following:

The committee feel deeply impressed with the importance of the questions of the cost of stoves for the present year, and the prices for which they shall be sold. From the best information they have been able to obtain, they are led to believe that such qualities of iron as are required for the manufacture of stoves are now held at \$40 to \$45.

It is also their opinion that nearly every other article which enters into the cost of stoves will be largely increased over the cost of 1879.

It is their opinion, also, that the stocks of stoves, both in the hands of manufacturers and the trade, are smaller than usual, and that the indications all point to a larger volume of trade in the future than in the past.

The committee believe that stoves have generally been sold during the past three or four years at prices which did not warrant the outlay of capital and preparations necessary to conduct the business of manufacturing with success.

They can discover no good reason why stoves should not pay a fair living profit, as well as other branches of manufacture.

In view of these and other considerations that might be mentioned, they recommend that the minimum price of the lowest class of stoves be graded at 6½ cents per pound, with the cost for the material used in mounting and ornamenting added thereto, and a reasonable profit on the same, and further, that the prices of stoves of better qualities be arranged, at the discretion of the manufacturer, at 7 to 9 cents per pound, according to the kind and quality and with the same additional charges.

The committee are aware of the uncertainty as to the future price of iron, like all other things which are hidden in the future, and while they believe that the average for the year will not fall below \$40, they have suggested the price of 6½ cents and upward, upon a basis of an average cost of \$35 during the present year.

In respect to the subjects alluded to by our worthy president, of the enormous and often unnecessary cost for patterns, and the superabundant amount of nickel plate with which, to a greater or less extent, stoves are now ornamented, the committee think that, while the subjects are interesting for discussion, and upon which some time might well be spent, it is not within their province to make any recommendation.

The question of the employment of convict labor is one that could scarcely be treated intelligently by this committee without an extended investigation into its various aspects and relations, to which most of the members have given but little attention. They are aware that three commissions, composed of able and reliable men, appointed by the States of Massachusetts, Connecticut and New Jersey respectively, have been engaged for several months past in taking testimony and critically examining into the many intricate questions involved in the subject, and that their reports have been or are about being made. When these reports have been carefully read and the details fully digested, this association will be better prepared to act intelligently on the subject than at the present time. The committee, however, are informed that not more than 10 per cent. of the number of State prisoners of New York, the same being something over 4000, are now employed upon any one mechanical branch of manufacture.

The committee cannot close this report without urgently requesting every stove manufacturer to make a close and careful investigation into the cost of making and selling his stoves, and collecting the amounts from such sales, that they may be able to corroborate the statements heretofore made to this association, or to show their fallacy. What is desired by all is simply the truth.

The committee strongly recommend that a meeting of this association be held at Saratoga Springs, early in the month of July next, and that a committee be appointed by the president to make proper arrangements for the same.

JOHN S. PERRY.
JOS. W. FULLER.
J. B. RESOR.
W. H. WHITEHEAD.
CHARLES B. BOYNTON.
A. BRADLEY.

This report was adopted, amended as to its price basis recommendation as follows: "That the minimum price of the lowest class of stoves be graded on the basis of 6½ cents per pound for plain stoves, without grinding, polishing or nickel trimming, and that all extra trimming, grinding, polishing, nickel ornamentation and mica be charged extra."

On motion of Mr. Sard, the association adopted the following:

Resolved, that the terms of sale appointed by the association are four months' note, 5% off for cash in ten days, and 1% off per month for payments made after thirty days and upon maturity of note.

The *Moniteur* of Martinique prints an interesting story about the finding of an anchor belonging to the ship upon which Christopher Columbus sailed on his third voyage of discovery to the New World. On the night of August 1, 1498, says the *Moniteur*, the small fleet had come to an anchor at the southwestern extremity of the Island of Trinidad, to which the navigator had given the name of Arenas Point. Washington Irving relates that Columbus, who was a very poor sleeper, suddenly heard a frightful noise, apparently coming from the South. Rushing on deck he saw rolling toward him a wave as huge as a mountain, which threatened to submerge the fleet. All hands thought their last hour had come; but the only damage sustained was the loss of one of the anchors of the Admiral's ship. The

big wave was caused by the sudden swelling of one of the rivers that empty their waters into the Gulf of Paria, the existence of which was unknown to the discoverer. The incident is mentioned in the narrative of the voyage bequeathed to us by Ferdinand, Columbus' son. This historical anchor has been found after all these centuries by Señor Agostino, the owner of Arenas Point. It weighs 1100 pounds, and is of decidedly primitive form. Señor Agostino found it while making some excavations in his garden. This garden, upon careful measurement, appears to occupy the precise spot where rode the ships of the great mariner in 1498. The finder at first took his treasure trove for a Phœnician anchor, but upon attentive examination he found the date of 1497 on the stock.

The American Society of Mechanical Engineers.

By invitation of Prof. R. H. Thurston, of Stevens Institute; Prof. John E. Sweet, formerly of Cornell; Prof. William P. Trowbridge, of the Engineering Department of Columbia College, and other well-known members of the engineering profession, a meeting was held in this city on the 16th inst., to take steps to form a national society of mechanical or dynamical engineers. There are in this country associations of civil and mining engineers, but the mechanical engineers have had no society, though in England the same branch of the general profession of engineering has an association with 2000 members. Among those who took part in the proceedings were: F. F. Hemenway, of Troy; J. S. Con and E. D. Leavitt, of Cambridgeport, Mass.; Alfred B. Couch, of Philadelphia; J. E. Sweet, of Syracuse; Robert Grimshaw, of Philadelphia; C. C. Newton, Cleveland, Ohio; W. H. Odell, of Yonkers; Samuel Webber, of Manchester, N. H.; Egbert P. Watson, of Elizabeth, N. J.; Thomas R. Pickering; Frank E. Smith of Delaware, Ohio; C. T. Porter, of Newark, N. J.; William N. Hoffman, of Passaic; Prof. Trowbridge, of Columbia College, and Alfred R. Wolff, C. E. Emery, Herman T. C. Kraus, William Lee Church, A. L. Holley, John Fish, D. S. Hines, George M. Copeland, M. N. Forney, Henry R. Worthington and Lewis F. Lyne, all of New York.

Prof. John E. Sweet called the meeting to order and nominated Mr. A. L. Holley, of this city, for the chairmanship. Mr. Holley, after the approval of the nomination, briefly spoke of the need for, and importance of, such a society. Through the organization of a society professional rivalry would be wiped out, and much-desired facilities for the reading of papers and the comparing of notes would be established. Prof. Trowbridge, of Columbia College, expressed his concurrence in the movement. Other addresses favorable to the project were made by Messrs. Charles E. Emery, H. R. Worthington, Charles T. Porter and Samuel Webber. A draft of by-laws and rules to govern the new association was read by the chairman, and was then referred to a committee. It sets forth that the object of the society will be to enable mechanical engineers to meet and compare notes, and to facilitate the interchange of ideas respecting improvements in the various branches of mechanical science by the publication of papers, &c. The members are to be divided into four classes—regular members, associates, honorary members and junior members. The initiation fees are fixed at \$15 and \$10, and the annual dues, \$10. Payment of \$150 will entitle eligible candidates to life membership. A protracted discussion took place in connection with the selection of a title for the organization, and it was finally agreed to call it the American Society of Mechanical Engineers. Messrs. Worthington, Sweet, Holley, Leavitt and Porter were appointed a committee to nominate permanent officers.

New Rules of the Patent Office.

It is not generally known by those having business with the Patent Office that a new set of rules have been in operation since January 1st. As these rules are matters of very general interest, we give such as should be known to those who have business with the office:

All business with the office must be transacted by writing, and all letters addressed to the "Commissioner of Patents," Washington, D. C. All matter sent to the office whether by mail or express must be prepaid, otherwise it will not be received. A fee of \$15 must be paid on filing an application for a patent on an invention or a discovery, and an additional \$20 on the issue of the patent. A copy of the specifications and drawings of any patent which is in print (including all for several years past) will be mailed to any address in the United States for 25 cents, 20 or more at 10 cents each. No patents granted since March 2, 1861, can be extended except by act of Congress.

A patent may be obtained by any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country, and not patented nor described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts and expense, has invented and produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas-relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics; any new and original impression, ornament, pattern, print, or picture to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture; or any new, useful, and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, nor patented nor described in any printed publication, upon payment of the fees required by law and other due proceedings had.

If it appear that the inventor, at the time of making his application, believed himself

H. D. SMITH & CO.,

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Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

SARANAC HORSE NAIL CO.

Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

S. P. BOWEN, President and Treasurer.

J. W. LYNDE, Secretary.

PLATTSBURG, N. Y.

STERLING & CO., Agents, 7 and 9 Cliff Street, New York.

METALLIC AMMUNITION,
Rim and Central Fire, all Sizes.

GUN WADS, Black and Pink Edge,
Guaranteed Superior to any Imported.

THE UNION METALLIC CARTRIDGE COMPANY,

BRIDGEPORT, CONN.



PRICE LISTS WITH DISCOUNTS TO THE JOBBING TRADE ON APPLICATION.



PERCUSSION CAPS.

F. C. Trimmed Edge, W. Proof.
F. L. Ground Edge, W. Proof, Foil Lined, equal to any imported.
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Musket, Paper and Tin Boxes.
Berdan, Orcutt and Wesson Primers.
Bullet Breech Caps.

PAPER and BRASS SHOT SHELLS.

PAPER.

Celebrated "U. M. C." Sizes, 8, 10, 12, 14, 16, 20, Central Fire.

BRASS.

Berdan, Solid Anvil; Sturtevant, Movable Anvil. Buffington, Movable Anvil
Berdan Primer.

Kenney's Patent Indentation to prevent Wads from starting.

Agents: **HARTLEY & GRAHAM, New York.**



A. A. WEEKS,
Manufacturer of
Hardware Specialties,
89 John St., New York.

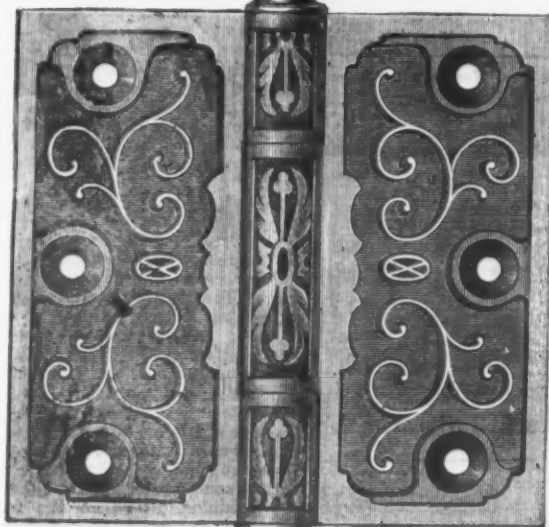


A. WYCKOFF,
Manufacturer of
Wyckoff Patent Wood Water and
Gas Pipe,
STEAM PIPE CASING,
PUMP TUBE, &c.
Established 1855. Send for pamphlet.
ELMIRA, N. Y.

THE CLARK MFG. CO.,

Successors to
MANUFAC

CLARK & CO.,
TURNERS OF

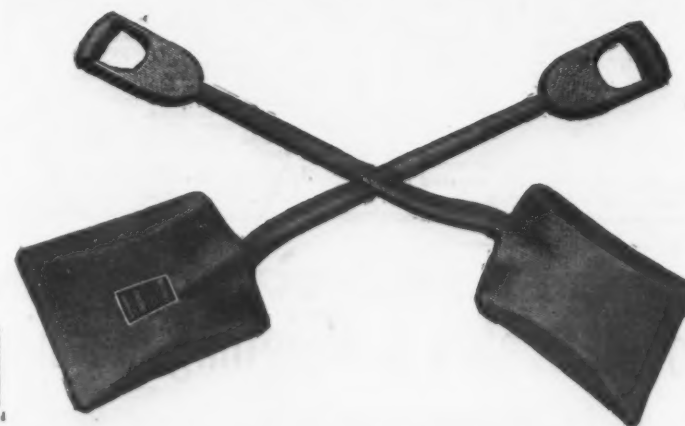


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AND PRICE LIST.

BUILDERS' HARDWARE,
BUFFALO, NEW YORK.

HUSSEY, BINNS & CO.,



PITTSBURGH.

SHOVELS,
SPADES and
SCOOPS.

PATENT

ANTI-WINDOW

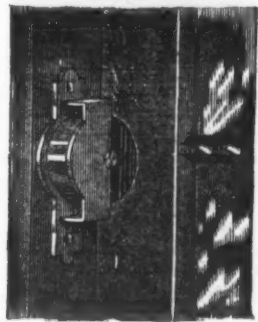
RATTLER,

FOR

Dwellings, Cars, Steamboats, &c.

The Anti-Window Rattler supplies a long needed want; it is so simple in construction that it can be used on any window, and so complete that it will prevent the slightest shaking, no matter how great the jar or how old the sash. As shown in cut, it consists of a rubber wheel in a nickel-plated or brass frame; is ornamental as well as useful, and does not interfere with raising or lowering the sash.

HEATON & DENCKLA, General Agents, 507 Commerce St., Philadelphia. GRAHAM & HAINES, Agents, 113 Chambers St., New York. OTIS D. DANA, Agent, 26 to 32 Pearl St., Boston, Mass.

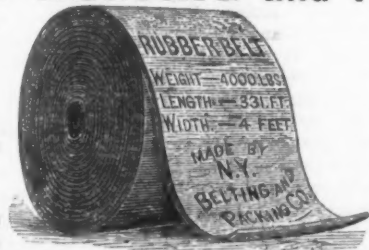


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ADAPTED TO MECHANICAL PURPOSES.

RUBBER BELTING and PACKING.

Machine Belting,
Steam Packing,
Leading Hose,
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Grain Elevator
Belting,
Steam Hose,
Piston-Rod
Packing,
Gaskets and Rings.



Vacuum Pump
Valves,
Ball Valves,
Car Springs,
Wagon Springs,
Gas Tubing,
Machine Belting,
Wringing Rolls,
Billiard Cushions,
Grain Drill Tubes,
Emery Wheels.

This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than twelve years, also those for Armour, Dole & Co., Chicago, and Vanderbilt's great elevators of the New York Central and Hudson R. R., New York, being the largest belts in the world. We are now making an Elevator Belt, 36 inches wide and 200 feet in length, which will weigh over 18,000 pounds.

LINEN and COTTON HOSE.

Pat. 645.

Plain and Rubber Lined.

Pat. July, 1873.



Circular Woven Seamless Antiseptic RUBBER LINED "CABLE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carbolized Duck, for the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c.



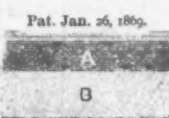
Emery Wheels and Packing.



ORIGINAL Solid Vulcanite EMERY WHEELS

LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.

The properties of these wheels are such that they can be used with great advantage and economy for cutting, grinding, and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Glass, etc. These wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Saws, Fire Arms, Wagon Springs, Axes, Skates, Agricultural Implements, and small Machinery of almost every description.



PATENT ELASTIC Rubber-Back Square Packing

BEST IN THE WORLD.

It represents that part of the packing which, when in use, is in contact with the Piston Rod. A elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight, and yet creates but little friction.

This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.

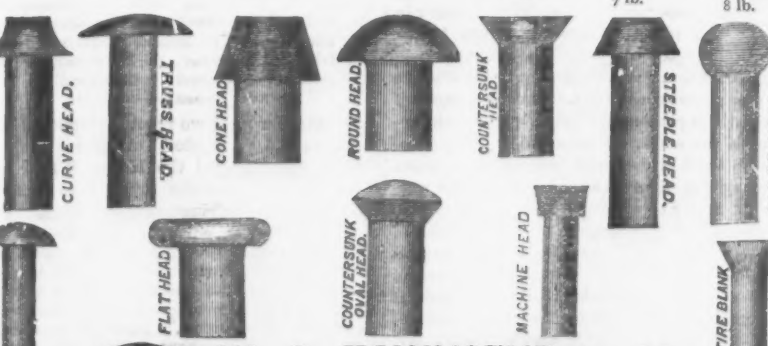
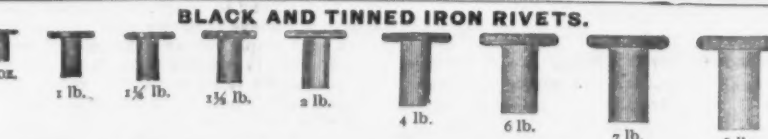
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For Halls, Flooring, Stone and Iron Stairways, &c.

Inferior quality forced on the public by reckless imitations of our patent goods soon becomes brittle and crumbles to pieces. Address

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W. P. TOWNSEND & CO.,
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Manufacturers of every description of First Quality RIVETS.

303 Euclid Ave., Cleveland, O. GEO. C. TRACY & CO., Solicitors and Counsel in Patent Litigation, 519 Seventh St., Washington. Send for "ALL ABOUT PATENTS," 140 Pages—Free.

PROVIDENCE TOOL CO.

Providence, New York, Boston, Chicago.



Wrist & Ankle Shackles,

REVERSIBLE

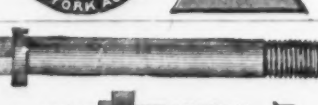
ICE AND FLOOR SCRAPERS,

MADE BY

PROVIDENCE TOOL CO.,

Providence, R. I.

The advantage of this Scraper is that each cutting edge can be changed as fast as worn, and present a new and sharp-cutting edge. Thus the Scraper can be used in the whole ice made available. It is especially useful in cleaning ice from sidewalks. Price, \$9 per doz.



N. Y. Mallet and Handle Works



Manufacturers of Calkers, Carpenters', Stone Cutters' Tin, Copper and Boiler Makers' MALLETS,

Hawking Beets, Hawking and Calking Irons; also all kinds of Handles, Sledge, Chisel and Hammer Handles. Also

COTTON AND BALE HOOKS, Patented Feb. 13, 1877; a new combination of Hooks. 456 E. Houston St., New York City.

THE FAR-FAMED AMERICAN LUBRICATOR. AMERICAN LUBRICATOR CO. DETROIT, MICH. U.S.A.

to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof if it had not been before patented or described in any printed publication.

The specification is a written description of the invention or discovery, and of the manner and process of making, constructing, compounding and using the same, and is required to be in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound and use the same. It must conclude with a specific and distinct claim and claims of the part, improvement or combination which the applicant regards as his invention or discovery.

The following order of arrangement should be observed when convenient in framing the specification, such portions as refer to drawings being omitted when the invention does not admit of representation by drawings:

1. Preamble giving the name and residence of the applicant, the title of the invention, and the statement required by the last clause of Rule 39;
 2. General statement of the object and nature of the invention;
 3. Brief description of the drawing, showing what each view represents;
 4. Detailed description, explaining fully the alleged invention, and the manner of constructing, practicing, operating and using it;
 5. Claim or claims;
 6. Signature of inventor;
 7. Signatures of two witnesses;
- The applicant, if the inventor, must make oath or affirmation that he does verily believe himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement for which he solicits a patent, and that he does not know and does not believe that the same was ever before known or used; and shall state of what country he is a citizen, and where he resides.

Available Canadian Sources of Ore Supply.

To the Editor of The Iron Age.—Sir: I see from your recent issues that one of the chief difficulties of the iron manufacturers, in the present condition of the trade, is to procure good ore at cheap rates and within easy reach. I therefore wish to say that close on the border line there are immense fields of good red iron ore. About 20 miles from the town of Napunee, in Canada, there have recently been leased to the Napunee and Tamworth Railway about 600 acres of land, which contains ore of the richest quality, according to the opinion of Prof. Chapman, of Toronto University, which is as follows:

Sesquioxide of iron.....	91.60
Alumina.....	0.66
Oxide of manganese.....	0.07
Lime.....	1.19
Carbonic acid.....	9.31
Phosphoric acid.....	0.04
Titanic acid.....	0.00
Siliceous rock matter.....	5.38
Total.....	99.66

These results are said to be equivalent to:

Metallic iron.....	64.12
Sulphur.....	0.049
Phosphorus.....	0.007

and as the intermixed rock is comparatively low, the deposit may be regarded as of great value.

In the same district is found lead in great quantities, and fine beds of marble. The Napunee and Tamworth Railway Co. have obtained bonuses from several manufacturers toward the cost of building the road, and as there is nothing in the way of heavy engineering to be done on the proposed route of the line, it is calculated that the road could be built in six months.

The prospects for traffic are good, because there are good towns at each end of the line (which is to be 27 miles long), and several important villages, besides three paper mills and other works. There is every inducement for the promoters to carry out the work with all speed. If the project was in the hands of good live men, who could command capital within six months from this time, one of the richest feeders for the American iron trade would be in full blast. And as the employment of iron now enters largely into the construction of even private dwellings, and the iron roads of America now reach 250,000 miles, and thousands of miles of new roads are either projected or under construction, the American manufacturer needs look to new sources of supply of raw material. Yours faithfully,

SAMUEL CAPPER.
MOTT AVENUE, MORRISANIA, Feb. 6, 1880.

Patent Amendments Now Being Pressed in the U. S. Senate.

To the Editor of The Iron Age: The following is of great and immediate interest to many thousands of your readers:

Forty-sixth Congress, Second Session, H. R. 4412.—In the Senate of the United States, February, 10, 1880.—Read twice and referred to the Committee on the Judiciary.

AN ACT
To regulate practice in suits brought to recover damages for infringement of patents.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That hereafter in any suit brought in any court having jurisdiction in patent cases for an alleged use or infringement of any patented article, device, process, invention or discovery, where it shall appear that the defendant in such suit purchased the same in good faith for his own personal use from the manufacturer thereof, or from a person or firm engaged in the open sale or practical application thereof, and applied the same for and to his own use and not for sale, if the plaintiff shall recover a judgment for \$5 or less as damages, the court shall adjudge that he pay all costs of suit; and if the plaintiff shall not recover

the sum of \$20 or over, the court shall adjudge him to pay all his own costs, unless it shall also appear that the defendant, at the time of such purchase or practical application, had knowledge or actual notice of the existence of such patent; provided that nothing contained herein shall apply to articles manufactured outside of the United States.

Passed the House of Representatives, February 9, 1880.

Attest: GEO. M. ADAMS, Clerk.

On the 9th of February last, under a suspension of the rules for the purpose of cutting off debate, the above bill, after being read from manuscript, was rushed through the House of Representatives.

The duty of every Representative to provide opportunity for debate, and give careful consideration to bills of this character, seems imperative, but the above was evidently a reckless bit of legislation.

Since this bill passed the House its advocates have manifested an unbecoming anxiety to crowd the measure through the Senate also, which, coupled with the trickery resorted to for the purpose of securing its passage through the House, and printing it in the Congressional Record as House Record "4419," instead of giving its correct number, which was "4412," justifies the suspicion that this innocent appearing bill of nineteen lines covers a cat in the meal somewhere.

The fact is, House Bill 4412 is but the entering wedge; the real aim of its promoters is to overturn the entire patent system, and virtually confiscate all property in existing patents.

This explains why the bill was introduced through other than the Patent Committee (whose action was being watched), accounts for the disposition to prevent its features from being discussed, and also suggests a motive for printing the wrong number in the Congressional Record.

The advocates of No. 4412 proclaim that it is a bill to prevent claims being made against users of small patented articles under cover of patent papers which will not bear investigation, and that by such means large sums have been extorted from the users of devices not entitled to the protection of a patent, because it was found cheaper to pay the demand than to contest the claim.

If such is the object of bill 4412, let it be amended so that none of its provisions shall apply to claims made under patents pronounced valid by a United States court of competent jurisdiction.

Such an amendment would in no way lessen the efficacy of this bill as a protection against fraudulent patent claims, while it would enable honest inventors to secure their rights in inventions whereon a moderate royalty is claimed, as well as from those where the royalty demanded is much larger.

Bill 4412 would compel inventors to demand above \$20 royalty on inventions they would otherwise offer to the public for a much less sum, but for the penalty therein affixed against all who shall fail to collect a larger sum than \$20 through the courts.

If the advocates of this legislative monstrosity (4412) would frame a bill to enact that, hereafter, no invention shall be entitled to protection under the Patent Laws of the United States, unless its royalty shall be fixed above \$20 (except only such discoveries as it is impracticable for irresponsible persons to sell or apply), they would present the issue involved in Act 4412 plainly.

Bill 4412 reads: "If the plaintiff shall recover a judgement for \$5 or less as damages, the court shall adjudge that he pay all costs of suit, and if the plaintiff shall not recover the sum of \$20 or over, the court shall adjudge him to pay all his own costs." With the pretense of fairness, it provides that the plaintiff who has shown himself entitled to recover before the courts, may escape the penalty attached to the recovery of not more than \$20, by proving what every man familiar with patent suits knows it is quite impossible to prove.

In other words, royalties of \$20 or less could only be collected through the courts, under the most favorable circumstances, by the expenditure of five or ten times the sum to be collected, if patent amendment 4412 should become a law.

Our government ought not to attempt to violate contracts entered into with its citizens who, having made known their discoveries (in fulfillment of their part of the obligation), would be left without a remedy should they be refused the protection of the courts.

Let each and every holder of a patent protest against the violation of such contracts. Let them remember that Act 4412 is but the forerunner of other acts of injustice, which those who are in favor of abolishing the Patent Laws have in contemplation.

There are hundreds of thousands of industrious citizens interested in patents who are also entitled to vote. Let each one of them write to the Senators representing his State (or to any Senator of the United States), demanding to be protected from demagogical legislation.

Let them respectfully ask that the Senate consider Act 4412 carefully. A majority of the Senators will oppose the bill when its objects are fully understood by them.

If any should vote for it after having their attention called to it, they may then reasonably be held accountable for their acts.

Much of the responsibility for unjust enactments is fairly chargeable to the supineness of those directly affected by them.

Let patentees and all interested in patents bestir themselves, as patent amendment 4412 is now pending in the United States Senate and being pressed by parties opposed to patents.

The proprietors of the American Line of Mail Steamers to Brazil were questioned by an Iron Age reporter in regard to the recent consular report from that country, intimating that the line had a precarious existence. The reply was that trade had fallen off so much, for various reasons, and freights were so light both ways that without aid from the United States government, in some form or other, the maintenance of direct steam mail service between the two countries would be extremely difficult to maintain. A sale of the steamers has never been thought of.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, February 19, 1880.

DAVID WILLIAMS . . . Publisher and Proprietor.
JAMES C. HAYLES . . . Editor.
JOHN S. KING . . . Business Manager.

RATES OF SUBSCRIPTION INCLUDING POSTAGE.

IN THE UNITED STATES, BRITISH AMERICA AND SANDWICH ISLANDS.

Weekly Edition . . . \$4.50 a year.
Semi-Monthly Edition . . . \$2.30 a year.

Issued every Thursday morning.
Issued the First and Third Thursday of every month.

Monthly Edition . . . \$1.15 a year.
Issued the First Thursday of every month.

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NEWSDEALERS OR BOOKSELLERS in any part of the world may obtain *The Iron Age* through the American News Company, New York, U. S. A.; the Wilmer & Rogers News Company, New York, U. S. A.; and London, England; or the San Francisco News Co., San Francisco, California, U. S. A.

ADVERTISING.

One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.50; three months, \$15.00; six months, \$25.00; one year, \$45.00; payable in advance.

DAVID WILLIAMS, Publisher, 33 Reade Street, New York.

PITTSBURGH . . . 77 Fourth Avenue
J. D. WEAVER, Manager and Associate Editor.

PHILADELPHIA . . . 22 South Fourth Street
THOS. HOBSON, Manager.

CINCINNATI . . . Builders' Exchange
T. T. MOORE, Manager.

CHATTANOOGA . . . Eighth and Market Streets
S. B. LOWE, Manager.

BRITISH AGENCY.

The publishers of *The Iron Age*, 33 Cannon Street, London, England, will receive orders for subscriptions and advertisements on our regular terms.

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Men in the midst of a strike can hardly be expected to be consistent in their words and acts. It has been proposed to bring to Pittsburgh a lot of Belgian miners, and negotiations to this end are progressing. The trades assembly, in a series of pompous resolutions, denounces this attempt "to force foreign labor" upon this country, and pledge themselves "to be untiring in their efforts to have the wrong done to American citizens righted, cost what it may." The absurdity of these bombastic resolutions would be manifest if the names of those adopting them were published. The probability is that not one American-born citizen voted for them. A party signing himself "A Foreign Miner" retorts, in a late number of the *Pittsburgh Dispatch*, as follows: "Who are the American miners? Where are they? On the Pan Handle Railroad, barring the colored miners at Steen & Robbins' mines, there is not five per cent. of the men employed citizens of the United States. The shorter time a foreign miner has been in the United States the more he will strike. In after years, as he becomes more accustomed to the country, the less he will strike. You hardly ever see an American leading a strike. Of all the prominent

"miners who have come to the front in the last ten years, none have been Americans. Strikes are not an American institution, but have been imported, to the ruin of the coal miners, and from year to year are getting worse." We have not one word to say against a Welshman or Scotchman, English, Irishman or German, but when miners of these nationalities pass resolutions denouncing a Belgian or even a Chinaman as a foreigner, we are inclined to laugh.

Congressional Regulation of Inter-State Commerce.

In tampering with the railroad question on the plan proposed in the Reagan bill, which seems to have been set aside in committee, or on that presented in the bill which the House Committee on Commerce has agreed to by a vote of 9 to 6, Congress is essaying a very dangerous experiment. The Reagan bill was a measure which a representative "Granger" would consider after his own heart, its chief object being to prohibit those discriminations in favor of through business and against local traffic, which seem so unjust, but which cannot be prevented without depriving the commerce of the country of the advantage it now enjoys from the low rates charged on freights carried for long distances between competing points.

A careful examination of the new bill of the House Committee on Commerce, shows that it is a bold attempt to centralize in the hands of a bureau, to be attached to the Department of the Interior, the practical control of such railroads as are engaged in inter-State transportation. The Board of Railroad Commissioners which it creates are vested with new, and in some respects extraordinary, powers, which it is scarcely probable they would exercise with judgment and discretion. This board is a commission of spies set to watch the railroads, search their books, summon witnesses, call for persons, papers, &c., to see that existing and proposed acts of Congress relating to inter-State commerce are carried out. Among the provisions of the bill we find the following:

Sec. 9. No company or companies, railroad corporation or corporations, organization or organizations, person or persons so engaged as aforesaid, in operating a line or lines of railroad through two or more States or parts of States, as aforesaid, shall charge, collect, demand or receive more than a fair and reasonable rate of toll or compensation for the transportation from one State or Territory to another State or Territory, or to or from any foreign country, so far as the same shall relate to commerce between the States, of freight of any kind or description, or for the use and transportation of any railroad car upon its track, and for each and every violation of this act, by charging, collecting, demanding or receiving more than such reasonable rate the company or companies, corporation or corporations, organization or organizations, person or persons so offending, shall be jointly and severally liable for extortion, and subject to the forfeitures and penalties hereinafter provided.

Sec. 10. No railroad corporation, organization or person, whether engaged alone or associated with others in the transportation of property between the States by railroad, steamboat, canal boat or other water craft within the purview of this act, shall directly or indirectly charge to or receive from any person or persons any greater or less rate or amount of freight charge or compensation than is by them charged to or received from any other person for the same facilities, and for like and contemporaneous service under similar circumstances and conditions in the carrying, storing or handling of the same, on or over the same line of transportation; and all such railroad corporations and persons engaged as aforesaid, shall furnish, as nearly as may be and as may reasonably be within their power, and without discrimination, the same facilities for the carriage, storage and handling of all property of like character carried by it, him or them, as aforesaid, and shall, as near as reasonably may be, perform with equal expedition the same kind of services conducted with the contemporaneous service under similar circumstances and conditions as aforesaid. No break of bulk or interruption, nor any contract or understanding, shall be made to prevent the carriage of any property from being treated as one continuous carriage in the meaning of this act, from the place of shipment to the place of destination, unless such stoppage, interruption, contract or understanding was made in good faith for some practical and necessary purpose, without any attempt to avoid or interrupt such continuous carriage or to evade any of the provisions of this act.

Section 11 prohibits the allowance or acceptance of rebates, drawbacks or other advantages which are not equally allowed to all shippers. Section 13 provides that: "No persons engaged in the carriage, storage or handling of property, as mentioned in the tenth and eleventh sections of this act, shall enter into any combination or agreement the object of which shall be to prevent, by changes of schedule, carriage in different cars, breaking different carloads into less than carloads, or by any other means, the carriage of such property from being continuous from the place of shipment to the place of destination, whether carried on one or on several railroads." The penalties prescribed for violations of the provisions of the act are fines to the amount of three times the damage sustained by parties suffering from such violation, to be recovered by suit in a United States district or circuit court.

The fundamental mistake in all such crude experiments at legislation as this bill seems to be, is that they seek to effect results which can only be brought about through competition, and that anything looking to an improper government interference with railroad management, tends to discourage the investment of capital in new lines of road, and so prevents the increase of competition. The underlying idea of all this class of legislation is that the railroads are in some sense public property, and that the people, through their representatives at Washington or at

the State capitals, have a right to so control their management that the capital invested in their construction and equipment shall be rendered unprofitable. Experience has shown that the problem of cheap transportation is solving itself—slowly, it may be, but certainly. Experiments made in several States, notably in Wisconsin, where for years the Granger idea dominated State politics, have shown very clearly that these sweeping measures of "reform" defeat themselves, and that instead of benefiting the forwarder, they are inimical to his real interests. There is no doubt that there are evils existing in the present system of railway management which might with advantage be modified. The industrial and commercial future of this country is in a peculiar degree dependent upon cheap transportation, and high charges for long-distance carriage are among the great drawbacks to our commercial prosperity. At the same time we must be careful that in trying to cure evils of one kind, we do not create others still more serious. We cannot begin our work safely by a reckless onslaught upon corporate rights, or we shall create what does not exist—a railroad monopoly. In view of the importance of the subject to all sections of the country, Congress could not probably do better than to create a national commission to study the problems of inter-State commerce; but it is not yet ready to enact the provisions which are embodied in those sections of the bill from which we have quoted above as impose specific requirements upon the railroads. This is probably the most important question of practical statesmanship now presented for the consideration of the American people. The House Committee on Commerce is not competent to deal with it off-hand, and if they are permitted to do so we have much to fear, and little to hope for, from the results of their deliberations.

Foreign Steel Rails.

The remarkable promptness with which Mr. James M. Swank publishes a close approximation of the production of iron and steel in the United States, ought to serve as an example to the slower statisticians on the other side of the Atlantic. We have carefully watched, but in vain, for any reliable statement as to the output of the steel mills of the various countries of Europe for the year 1879, and as there appears to be much uncertainty as to the capacity of foreign works, a few data which throw some light upon the subject may be acceptable. England produced in 1878, with 63 converters working, out of 110 built, only 633,000 tons of steel rails, which would show an output of about 10,000 tons per annum to each converter. It is stated, on good authority, that 78 converters are now at work in the United Kingdom, and allowing for further accessions to the number, which, however, will probably be below the average in production, a safe estimate for the maximum output for 1880 will be 775,000 to 800,000 tons of steel rails. To some extent Germany may be considered the country which is capable of the greatest expansion. In 1878 Prussian works, running 25 out of 50 vessels, produced 375,000 tons of rails, which the works in Saxony and the Palatinate swelled to 400,000 tons. By the starting of idle works and extensions of plant in others, a very large increase would probably follow. France made in the first 6 months of 1879, 105,000 tons of steel rails, so that an estimate of its capacity in 1880 would not fall short of 275,000 tons. Belgium is rated by some at 150,000 tons, while Austria, if pushed, with its plant of 32 converters, though on the average they are of small size, would be able to contribute something like 250,000 tons. Sweden has quite a large number of small vessels, and together with Russia, which possesses a few more ambitious works, may be rated at 150,000 tons. Adding 750,000 tons for the United States, we obtain a grand total of about 3,000,000 tons as the capacity of the steel rail mills of the world. Whether the manufacture of this enormous quantity would be profitable to all those engaged in the business, is a question which primarily depends upon the extent and the urgency of the demand. On this point only meager data are available. Beyond the fact that France proposes to build 16,000 miles of railway in the next ten years, and that the maximum extension of the English railway system is estimated at 500 miles, while Spain expects to build 400 miles, nothing is known of the probable extension of the railway systems of the world. In Europe, it is true, the demand for railway material for new roads is small, when compared with the quantities of supplies required for the repair of a network of railroads which is elaborated in its main features and calls for little extension. But it is manifestly impossible to say how far the more conservative railroad administrations of the Old World have pursued the policy of allowing their permanent way to deteriorate, on account of unsatisfactory or unprofitable business during the past few years. It is not likely that this lack of sound management has been carried as far in those countries as it has been here, and therefore the demand is not likely to exceed production. It would, on the contrary, appear as though the rapid rise abroad is more the result of a speculative movement, which is based more upon the expectation of future needs than upon the actual necessities of the present time. A knowledge of the important expansion of which the output of the mills is capable, will

not tend to encourage those managing Continental and British railways to enter the market just now.

A Secret South American Alliance.

Chili and the Argentine Confederation seem to be drifting into war, and the question is often asked, What is it all about? In answer to this we may say that the dispute relates to the possession of the Straits of Magellan, which are very important to Chili, as the forts there located command the route of communication with Europe. Vessels can take the open sea route round Cape Horn, but that is six days longer, and is a stormy and objectionable voyage.

The old boundaries of the Spanish viceroyal provinces were long considered to be those of the Atlantic and Pacific States which had secured independence of Spain. As between Chili and Buenos Ayres this made the Andes the boundary line, giving Chili a port and islands at the western end of the Straits of Magellan. Patagonia is east of this range of mountains, and is claimed to belong to the Argentine Confederation, as heirs to the old Spanish dominions under the vice-royalty of Buenos Ayres.

Chili is the most prosperous of all Spanish speaking countries. Her people, inhabiting a mountainous region, are rugged and independent. They take naturally to civilized arts, possess a substantial government and accumulate wealth. Their extensive commerce with Europe led to the establishment of a small settlement on the Straits of Magellan, which was afterward garrisoned by a few soldiers, and at one time served as a penal colony for Chilean criminals. Lines of steamers increased the importance of this settlement, and when the Argentine government demanded explanations, Chili laid claim to all the southern end of South America, including not only the Straits, but also a frontage of several hundred miles on the Atlantic Ocean, which would give Chili ports on the eastern coast of the continent.

Buenos Ayres is only one of the States of the Argentine Confederation, but the viceroyalty of Buenos Ayres, when governed by Spain, included the entire territory now comprised by the States of the Argentine Confederation. As Buenos Ayres is at the mouth of the great river La Plata, it is the outlet of all Argentine commerce. Hence, the difficulty arising between Chili and Buenos Ayres.

Buenos Ayres ranks next to Chili in point of civilization, and follows close upon it. In both countries the people are better educated and more civilized than the people of Spain.

It is said that the Chilean government are willing to surrender the territory fronting on the Atlantic, and a part of the Straits of Magellan, but the Argentine government demand a restoration of the old boundaries, which would give Chili the western end of the Straits.

The Argentine minister, Señor Garcia, is the best Spanish diplomat in service. He is accredited to France, England and the United States, and is fully able to look after his country's interests at all three points. He has furthermore attended to the construction of some formidable ironclads. He writes to the *London Times* that there is no truth in the rumors of impending difficulties with Chili, and advises the holders of Argentine bonds not to sell. Of course, as he is selling bonds himself for his government, he could not do otherwise; but it is well-known among diplomats that before Chili opened fire on Bolivia, there was a secret treaty between Bolivia, Peru and the Argentine Confederation, which amounted to an offensive and defensive alliance, and the Argentines are now waiting for Chili to openly restore, by treaty, the old boundaries at the Straits, and to withdraw their governor and troops from Punta Arenas, in Patagonia, before complications arise.

One by one the most remarkable features in connection with the Tay Bridge come before the public. We have already referred to the startling developments in regard to the insufficiency of the pillars and their bracing, and to the unaccountably reckless manner in which the pillars themselves were bolted down to the top courses of the masonry coping. Attention was early drawn to the absence of any allowances in Mr. Gilkes' estimates of the surface presented by the girders to the action of the wind, for the exposed surface of the leeward girder, and to the fact that, accepting his figures as correct, there was only a factor of safety of two for the overturning of the girders, assuming, of course, as Mr. Gilkes did, that the pillars be regarded as unyielding. The whole profession appears to have accepted his statements at the time without a dissenting voice, and the warning of some few, among whom Mr. Grothe is prominent, was entirely disregarded. From present developments it seems a miracle that the bridge has remained intact so long. Small as the factor of safety was, it dwindles down to nothing when it is learnt that, instead of 800 square feet, no less than 1700 were presented by one single girder as the area available for the action of the wind. Adding to this an allowance for the surface of the lee girder not protected by the train, the area of the latter, probably 2000 square feet more, and, finally, 800 feet for the pier, we reach a total of at least 5000 square feet. With such facts before them, it does not appear harsh that

members of Parliament are asking for the appointing of a committee of experts, to examine into and report upon the accuracy of the designs made by Sir William Bouch for the latest and greatest English enterprise of this kind—the Frith of Forth Bridge.

The frequent and important sale of coking coal lands in the Connellsville district, which we have noted from time to time in our columns recently, indicate most clearly the growing confidence in coke as the future blast-furnace fuel. We have so frequently, during the past four years, referred to the advantages of coke for this use, that we do not intend to discuss them here, but simply to state that the experience with it in the anthracite furnaces of the East proves conclusively that, with a proper proportion mixed with anthracite, the results in increased yield are surprising. When failures have been recorded, or when the increased yield has been light, these results can be nearly always traced to too small a percentage of coke. We have before us now the results at two furnaces—one on the Hudson and the other in Eastern Pennsylvania. The Hudson furnace used 25 per cent. coke, and got an increase of only some 5 tons on 30 tons previous make, with a mixture fully 50 per cent., or say 16½ per cent., while the Eastern Pennsylvania Furnace, with 50 per cent. coke and a 50 per cent. mixture, has increased 100 per cent., or doubled its make. There have been some changes in the method of blowing these furnaces that have aided in these results, but these changes have been made possible by the use of coke. If our furnace men who have been using anthracite and coke as a mixture will take a little trouble and send us the details of their work, the results will not only be of use to others, but to themselves as well.

The present coal miners' strike in Western Pennsylvania has developed a unique and original idea for raising the sinews of war, and one that will send its originators down to posterity along with the other great financiers of days gone by. The strike had been in progress for some five weeks, and what with supporting miners who are inclined to go to work in opposition to the dictates of the miners' secretary, and what with paying for brass bands and martial music, to inspire the hearts of the strikers' brigade as they tramp along the dreary miles on the Pan Handle Railroad through mud and rain, with other expenses, funds were nearly exhausted, when a happy thought struck the Secretary of War. Do not other governments issue bonds? Bonds shall be issued, and before long the markets of this Western World will have placed upon them the bonds of the "Amalgamated Association of Miners and Drivers of Western Pennsylvania." We are not advised as to the amounts in which they will be issued; but as it is intended that it shall be a popular loan, the denominations will doubtless be small, and, as the bonds mature, others will be issued. We should suspect that Petroleum V. Nasby was the originator of this scheme.

We publish elsewhere an account of the preliminary meeting, held a few days ago in this city, to organize a society of mechanical engineers in this country. The absence of such an institution has long been felt, and with the example of the great success of kindred societies both in this country and abroad before them, it is a matter of some surprise that such a movement has not taken definite shape at an earlier period. Until now a few papers, which naturally would belong to the domain of such a society as that proposed, have been presented under unfavorable auspices to such societies as the American Institute of Mining Engineers, or the American Society of Civil Engineers, where naturally they did not elicit the discussion and consideration which they merited, nor did they go directly into the hands of those whom they were chiefly designed to reach. We have every reason to believe that the new society will meet with ample encouragement and strong support, and it remains with those organizing it to make it as successful as its older sister associations. As much depends upon its first organization, we trust that English models, if followed, will be sufficiently modified to be adapted to the peculiarities of this country. The names of those identified with it, however, are a guarantee that wise and liberal councils will prevail.

On another page we print a vigorous letter from "An Inventor," discussing the bill which lately passed the House "To regulate late practice in suits brought to recover damages for infringement of patent. (H. R. 4412)." Our correspondent deals with this bill none too severely, and his call upon inventors and all who are interested in patents to come to the defense of their rights, should bring a prompt response from all parts of the country. This bill is one of those sweeping measures which are full of mischief, and which mean a great deal more than would appear from a casual reading.

The American Metrological Society has prepared and is circulating widely a petition to Congress, asking for an early consideration of the report presented during the last session, in favor of the introduction of the metric system of weights and measures. The Committee of Coinage, Weights and Measures of the House of Representatives, pronounced in favor of the use of the metric denominations of weights and measures in the custom houses of the United States. To all those who wish to lend their support to a measure which, it is hoped, will prove a pre-

liminary step toward the ultimate adoption of the metric system, this petition offers a good opportunity. Prof. T. Egleston, of the Columbia School of Mines, secretary of the American Metrological Society, will no doubt be pleased to send all those interested a copy of the petition for consideration and signature.

THE NEW YORK MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

The annual meeting of the American Institute of Mining Engineers was begun on Tuesday night, at the rooms of the American Society of Civil Engineers, No. 104 East Twentieth street.

The meeting was called to order shortly after 8 o'clock by President E. B. Cox, who made a brief address. He called attention to the fact that for the first time in many years the institute met under conditions which might be described as those of general prosperity. This was a cause for congratulation in every sense but one, since many members were absent on business, who, under any other circumstances, would have been present and participated in the meeting. He hoped, however, that it would be pleasant and profitable.

The first paper of the session was read by Mr. E. F. Loiseau, on "The Successful Manufacture of Compressed Fuel at Port Richmond, Pa." After reviewing the course of his earlier experiments, which had been attended with many vicissitudes, he claimed to have attained commercial success in the manufacture of domestic fuel from anthracite dust, mixed with about 9 per cent. of pitch and 8 per cent. of bituminous dust. Thus made, the lumps held well together in burning, and had found already an ample and profitable market. His press would make 13 tons in an hour. The lumps were dried in eight minutes, and were then ready for shipment. His chief difficulty was to get an ample supply of dust.

Prof. Prime called attention to the fact that the work of the United States Testing Board had been left unfinished at a point when valuable results had just been reached, and offered the following resolutions:

Resolved, That the American Society of Civil Engineers be requested to co-operate with this society by the appointment of a like committee.

Resolved, That the committee have authority to request, in the name of the American Institute of Mining Engineers, contributions to a fund to be devoted to the completion of the experiments aforesaid.

Resolved, That the council of this Institute be authorized, whenever requested by the committee so appointed, to petition Congress for the free use of the testing machine at the U. S. Arsenal at Watertown.

Whereas, The American Institute of Mining Engineers have seen with regret that the work of the United States Testing Board has been suspended, through the lack of an appropriation by Congress, which appropriation does not seem likely to be renewed, and

Whereas, It seems most important to the vital interests of our iron and steel manufacturers that the experiments commenced by the United States Testing Board should be carried to successful completion;

Resolved, That a committee of three be appointed, to act with a like committee to be appointed by the American Society of Civil Engineers, to carry out to completion the work commenced by the United States Testing Board.

Prof. R. H. Richards, of Boston, was then called upon to read his paper, "Notes on Battery and Copper Plate Amalgamation, from the Mining Laboratory of the Massachusetts Institute of Technology." A series of experiments had been made with a small five-stamp mill with a view to investigate the conditions most favorable to a higher yield for gold ores than is generally obtained in ordinary practice. Prof. Richards soon found that two sources of error tended to vitiate the results: The one which he has termed the "overlapping error" is due to the circumstance that the amalgamated copper plates require, before attaining an efficient condition, saturation with a certain amount of gold, which does not appear in the returns if ordinary scraping of the plates is resorted to. He therefore adopted the plan of using a new set of the thinnest copper plates obtainable, for every experiment. The results arrived at with two different kinds of ores—one from Canada and the other from New Hampshire—strikingly illustrated the difference of the condition of the gold. In one case almost all the gold was obtained from the plates, within the battery, while very little would be gathered from the copper plates and the mercury trap. The fact that a large portion of the gold was deposited on the plates outside of the battery in the second case, proved in how finely divided a state the precious metal was in the ore. He had found, during the course of his experiments, that plates saturated with silver amalgam would not properly help him to overcome the errors due to the inaction of fresh plates. With these precautions he had succeeded in regaining 85 per cent. of the assay value of the ores. In the discussion following the reading of the paper, Mr. Park, who incidentally mentioned a new process for de-oxidizing copper, stated that he had found that plates free from oxygen would not take up gold. Prof. Silliman, who spoke highly of the line of experiment followed out by Prof. Richards, pointed to the experience of mill managers in the Black Hills and elsewhere, who all recognized the fact that the first runs of a new mill are far behind the later returns—a circumstance which was undoubtedly due to the fact that the copper plates must first be saturated. He spoke of recent practice at Bodie, where the difficulty of working ores with extremely fine gold was overcome by using a minimum of water and pumping the water back into the battery, where it was used over and over again. Mr. N. S. Keith said that a spongy condition

of the plates was a necessity for good work, and explained the manner in which it was probably formed, corroborating Mr. Park's observations. Mr. O. Heinrich, referring chiefly to the working of Southern ores, spoke warmly against the prevailing practice of fast driving of mills. He pointed, as an example of close working, to the old practice in the Tyrol, and urged the necessity of more cautious and careful stamping. It was owing to this unskillful use of the stamp mill that justice was not generally done to it.

After the announcement of the programme for the following days, the meeting adjourned.

The morning session on Wednesday, February 18, was opened by a paper on "The Claiborne Group and Its Remarkable Fossils," written by P. H. Mell, Jr., of Auburn, Ala., and read in part by the secretary, Dr. Thomas M. Drown. The Claiborne group, belonging to the tertiary, consists of six strata, of which the lower two are calcareous, while the third, a bed of quartz ore sand, with a maximum thickness of 30 feet, contains a remarkably great number of fossils in a beautiful state of preservation. Both in form and color, the large variety of shells are extremely well preserved. Mr. Mell has identified more than 250 species of shells from this one locality, and a collection, which is to be sent to the German government, were on exhibition. In the same locality are found also the remains of zeuglodon, a fossil which is known to reach the length of 100 feet. An important practical observation, made by Mr. Mell, is that both greensand and fossil bones are found in large quantities in this part of Alabama, and that the existence of this indication gives promise of the early development of the mining of phosphates, an industry so profitable in South Carolina.

The next paper read was by Mr. Julian Kennedy, of Braddock, Pa., the subject being "Blast Furnace Working." The speaker gave an account of the blowing in, during the first days of this year, of No. 4 furnace, belonging to the Edgar Thomson Steel Company, and the favorable results obtained in operating it. The paper, of which we shall publish an abstract at an early date, was accompanied by a sketch, showing the lines of the furnaces, and by full analyses of the Spanish, Algerian, Lake Superior and Pilot Knob ores used, the limestone and coke charged and the slag and iron obtained. Mr. Kennedy showed also a series of indicator cords of the blowing engines, and gave expression to the opinion that future progress in blast furnace management must be directed chiefly to an improvement of the blowing machinery used. In reply to questions by Mr. Faber du Four, why Mr. Kennedy objected to the use of cinder in blowing in and with blank charges, he stated that its use interfered with the attainment of a high heat in the hearth in the beginning, and, besides, was apt to render the tapping hole hard.

Mr. A. L. Holley then exhibited an interesting specimen of iron, which he said had probably been made hundreds of years B. C., having been found under the obelisk which is now being removed to this country. Dr. Wendel, of the Troy Bessemer Works, had found it to possess the following curious composition:

Iron.....	98.738
Carbon.....	0.521
Sulphur.....	0.022
Silicon.....	0.017
Phosphorus.....	0.048
Manganese.....	0.116
Nickel and cobalt.....	0.079
Copper.....	0.102
Calcium.....	0.218
Magnesium.....	0.028
Aluminum.....	0.070
Slag.....	0.150
Total.....	100.096

An able paper by Mr. J. M. Hartman, of Philadelphia, entitled "Notes on the Blast Furnace" then followed, in which the author elaborated his observations on changes which the stock undergoes in descending in the furnace. He considered closely the change of intensity of temperature in the different zones of the blast furnace, and stated that as the limit of the zone of fusion was generally sharply defined, there was the danger that with furnaces constructed according to the usual way, a skewback of pasty masses could be formed just above the zone of fusion. These defects he proposed to remedy by shaping the lines of the furnace in a way shown by drawings exhibited. An animated discussion, in which Messrs. Cox, Birkinbine, Primo, Faber du Four and others took part, followed. In the course of this debate the following interesting table of the comparative dimensions of the Edgar Thomson furnace (first column), and the figures called for by Bennett's rules (second column) was read by Mr. Hartman:

	Ft. In.	Ft. In.
Diameter of top.....	7 0	7 9
Diameter of bottom.....	25 6	21 9
Height of bosh.....	7 0	5 6
Height of bell.....	7 3	6 1
Height of tuyere circle.....	5 0	5 0
Height of tuyere center.....	5 6	4 0

Mr. Birkinbine questioned the possibility of the claim of establishing any well-defined rules for the rate of descent of stock in a furnace, owing to the disparity which must exist in various furnaces. He instanced the Warwick anthracite furnace, 16 x 55 feet, averaging last year 330 tons per week on 45 per cent. ores; the Bangor, Mich., charcoal furnace, 10 x 40 feet, making 330 tons per week on 60 per cent. ores, and the Edgar Thomson A furnace, 13 x 65, making over 500 tons coke iron with 60 per cent. ores, to show that with even extraordinary work the drive of the furnaces varied, and hence no rule would hold good. He also expressed doubts as to the possibility of establishing a definite ratio for zones of fusion with different fuels, based on the cubic foot of air per minute, and referred to a table he had prepared, showing the air consumption per ton of pig iron and per pound of fuel in various furnaces.

The papers on iron and steel were closed by an essay by Mr. Percival Roberts, Jr., of Philadelphia, on "The Puddling Process, Past and Present," in which he reviewed the history of the puddling process and pointed out the direction in which improvement must be sought. We shall, in a future issue, print an abstract of this paper.

A very interesting collection of crystal-

lized gold was then exhibited and described by Mr. R. B. Harrison, of Helena, Montana, who spoke of gold crystallization.

Prof. Henry Wurtz exhibited and described some unusual specimens of minerals from Silver Islet, Lake Superior, chiefly Huntolite and McFarlaneite.

Mr. Cox next read a brief paper on experiences with mine water in his boilers at the Drifton Collieries. He found that as they got deeper, the water in the mines became more and more sulphurous, and was very destructive of their boilers. They accordingly sunk an artesian well to the red sandstone—No. 11 of the Pennsylvania series—but found that the water it yielded contained a great deal of sulphate of lime and sulphate of magnesia, which made a heavy scale in the boiler. They then tried carbonate of soda with most satisfactory results, using about 12 lbs. of the carbonate of soda to 20,000 gallons of water. Since then no scale formed in their boilers, and by occasionally blowing out, the loose sediment was all removed, leaving the surface of the iron clean and bright.

The meeting was then adjourned.

The afternoon session was opened by the reading of a report from the Council of the Institute by the secretary. The financial statement of the Institute showed that sums amounting to \$7122.65 had been received, while the disbursements were \$6488.44; deducting from this \$620 for dues received in advance, a balance of \$14.21 was left, after paying for a deficit of \$500 from the previous year. The membership now comprises 5 honorary members, 53 foreign members, 616 members and 118 associates—a total of 792. The employment agency of the Institute is reported to bid fair to be of value. It is too soon, however, to comment on the working of the scheme. The Museum Committee reported that the final arrangements for the transfer of the Museum to the Pennsylvania Museum and School of Industrial Art had been consummated. The Council, through the secretary, announced a change of the rules, putting the foreign members on the same footing as American members.

The following members and associates were elected:

E. C. Appleton, L. Canal and N. Co., Pa.	Charles A. Bauer, Springfield, Ohio.	Jackson Bailey, New York city.	Theo. A. Blake, New Haven Conn.	Alfred P. Boller, New York city.	J. B. Brinsmade, New York city.	John C. Brown, Philadelphia.	Henri M. Brain, New York city.	Harvey B. Chess, Pittsburgh.	Richard E. Chism, Norristown, Pa.	A. W. Crookston, Glasgow, Scotland.	L. L. Crouse, Kingston, N. Y.	Gram Curtis, New York city.	W. B. Devereux, Kings Mountain, N. C.	Chas. E. Emery, New York city.	Hiram H. Fisher, Allentown, Pa.	George G. Frances, Montreal, Canada.	James Gayley, Catsaqua, Pa.	Robert Grimshaw, Philadelphia.	John H. Grove, Danville, Pa.	Henry J. Hall, New York city.	J. F. Hartranft, Philadelphia.	Ethan A. Hitchcock, St. Louis, Mo.	W. A. Hooker, New York city.	Fred. T. Hunt, Capetown, Canada.	J. E. Johnson, Longdale, Va.	John T. Jones, Sharon, Pa.	Clarence King, Newport, R. I.	James G. Knapp, Philadelphia.	John H. Knox, Andover, N. J.	James C. Lewis, Portsmouth, Ohio.	John C. Lewis, St. Louis, Mo.	Edwin Ludlow, Philadelphia.	A. M. McComb, Philadelphia.	E. D. McCulloch, Aurora, Ill.	Chas. F. Manness, Scranton, Pa.	G. W. Maxson, Auburn, Ala.	C. C. Morgan, Denver, Col.	J. C. Morse, Marquette, Mich.	Wm. D. Mullin, Latrobe, Pa.	Chas. M. Noble, Aniston, Ala.	Chas. C. Newton, Cleveland, Ohio.	W. N. Page, Hawk's Nest, W. Va.	Chas. T. Porter, Newark, N. J.	R. D. Rickard, Middletown, N. Y.	Wm. B. Ridgely, Springfield, Ill.	E. E. Robinson, St. Albans, Vt.	W. T. Sprague, Scranton, Pa.	David Townsend, Philadelphia.	Chas. R. Westbrook, Ogdensburg, N. Y.	C. A. Wheelock, Santa Fe, New Mexico.	Samuel Whinery, Wheeler, Ala.	David Williams, New York city.	Walter C. Witherbee, New York city.
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ASSOCIATES.
F. E. Bachman, Easton, Pa.
C. P. Bleeker, New York city.
Alex. B. Cox, Drifton, Jeddo P. O., Pa.
Austin Farrell, Easton, Pa.
Frank Klepetko, Cleveland, Ohio.
W. B. Kunhardt, New York city.

Prof. Henry Wurtz then presented an elaborate paper on the Strong water gas, dealing at great length with many questions of fact and theory brought up within the last few months in various reports and newspaper articles on the subject. Discussion was postponed till a future meeting.

The Secretary then presented the following list of officers for the ensuing year, reported elected by the scrutineers:

PRESIDENT —W. P. SHINN.	VICE PRESIDENTS —JAS. A. BURDEN, C. B. DUDLEY, PERCIVAL FRAZER, JR.	MANAGERS —J. C. BAYLES, W. S. KEYES, PERCIVAL ROBERTS, JR.	TREASURER —THEODORE D. RAND.	SECRETARY —THEO. M. DROWN.
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The secretary read a paper by W. H. Merritt, of St. Catharines, Canada, on "The Coal and Iron Field of North Staffordshire, England," of which we shall present a full abstract at an early date.

Bilbao Ores.—We are indebted to Mr. J. Llera, of this city, for the following notes in regard to prices of Bilbao ores: In June last the price of ore, free on board, at Bilbao, was 5/6; in September it ranged from 6/6 to 7/-. It rose to 8/ during November, and reached 10/9 six days afterwards. On the 15th of January 14/ was reached, which was followed by a rise to 16/ on the 24th. The last advices, dated

the 4th of the present month, place the figures at 16/10, and as the miners refuse to take large contracts for future delivery, it is thought at Bilbao that 20/ may become the ruling quotation. We may add that the total shipments from the port of Bilbao during the year 1879 footed up to 1,129,839 tons, while those of the first 20 days of the present year amounted to 125,000 tons.

The Railway Protests Against Reduction of Duty on Steel Rails.

(From our Special Correspondent.)

WASHINGTON, D. C., Feb. 18, 1930.

It was informally decided in the Committee of Ways and Means, immediately after the disposition of the Funding Bill, to renew the consideration of Bill 3234 to reduce the duty on steel rails from 23¢ to 10¢ per ton. Recent developments have rather opened the eyes of some members who are capable of appreciating a fact, even if it does not accord with their own notions of things. During the hearing before the committee some days ago, it was declared that the railroad interest, in a number of cases, was opposed to the reduction. This declaration was challenged by several of the extreme free traders on the committee, and it was requested by the friends of American manufactures to allow them time and they would produce more substantial evidence of this fact than mere unsupported statements. At the meeting of the 17th quite a sensation was created by the production of protests from presidents or vice-presidents of companies operating over fifteen thousand miles of road. The following is a copy of the general form of these protests:

To the Honorable the Senate and the House of Representatives of the United States of America in Congress assembled.—The undersigned, believing that any modification or material changes in our tariff system, to be productive of any benefit to the people, and not unjust and injurious to the industrial interests of the country, should be general in character, and that attacks upon special interests cannot with safety be made, respectfully remonstrate against the passage of House Bill No. 3234, known as the Covert bill, which proposes to reduce the duty on imported steel rails from 23¢ per ton to 10¢ per ton. We believe that the proposed reduction would seriously cripple the great interest represented in the manufacture of steel rails, and would result in no compensating benefits or advantages to the government or to the country at large. For these, among other reasons, we are opposed to the passage of the bill mentioned.

The following is a complete list of the protests submitted up to date and by whom:

Franklin B. Gowen, Philadelphia, President Philadelphia and Reading.....	869
A. B. Stone, Chicago, President St. Louis, Keokuk and Northwestern.....	135
G. B. Roberts, Philadelphia, Vice-President Pennsylvania Railroad Company.....	1,782
J. N. McCulloch, Pittsburgh, Vice-President Pennsylvania Company.....	3,535
J. N. McCulloch, Pittsburgh, Vice-President Pittsburgh, Cincinnati and St. Louis.....	201
A. J. Cassatt, Philadelphia, Vice-President Northern Central.....	322
A. J. Cassatt, Philadelphia, Vice-President Baltimore and Potomac.....	90
A. J. Cassatt, Philadelphia, Vice-President Alexandria and Fredericksburg.....	38
Isaac Hinkley, Philadelphia, President Philadelphia, Wilmington and Baltimore.....	207
Charles Hartschorn, Philadelphia, President Lehigh Valley.....	393
William A. Ingham, Philadelphia, President East Broad Top.....	30
E. C. Knight, Philadelphia, President Central Railroad of New Jersey.....	51
E. C. Knight, Philadelphia, President Delaware and Bound Brook.....	34
F. A. Conly, Philadelphia, President North Pennsylvania.....	105
Robert H. Sayre, Bethlehem, President Penn. & N. Y. Canal & R. R. Co.....	128
M. E. Ingalls, Cincinnati, President Indianapolis, Cincinnati and Lafayette.....	195
M. E. Ingalls, Cincinnati, President Cincinnati, Lafayette and Chicago.....	105
E. T. Hatfield, Jr., New York, President Green Bay and Minnesota.....	244
Samuel Sloan, New York, President Delaware, Lackawanna and Western.....	670
E. T. Hatfield, Jr., New York, Secretary and Treasurer Sussex Railroad.....	34
Le Grand B. Cannon, New York, Director Delaware and Hudson Canal Co.....	665
Albert Keep, Chicago, President Chicago and North Western.....	2,158
G. St. John Sheffield, New York, Vice-President New Haven and Northampton.....	109
Henry Wood, Philadelphia, President Philadelphia and Baltimore Central.....	57
James Calvery, Pittsburgh, President Pittsburgh and Western.....	47
Alexander Mitchell, Milwaukee, President Chicago, Milwaukee and St. Paul.....	1,513
R. A. Packer, Sayre, Pa., General Manager Pennsylvania and New York Canal and Railroad Co.....	Given above
John S. Barbour, Alexandria, President Washington City, Virginia Midland and Great Southern.....	360
T. C. Platt, Oswego, N. Y., President Southern Central of New York.....	114
T. B. Blackstone, Chicago, President Chicago and Alton.....	678
George E. B. Jackson, Portland, Me., President Maine Central.....	375
Total.....	15,460

The arguments on both sides of the Covert bill are now being printed, and as soon as completed it is expected that the committee will be ready to proceed.

Mr. Henderson's Little Tariff Bill.

Mr. Representative Henderson, who represents an Illinois district in Congress, has distinguished himself by presenting a bill which is designed to change so much of the present tariff as relates to iron and steel. It provides that the duty on pig iron shall be \$4 per ton; on bar iron rolled or hammered, consisting of flats of not less than one inch or more than six inches wide, not less than three-eighths of an inch or more than two inches thick, and rounds not less than three-fourths of an inch or more than two inches diameter, and squares not less than three-fourths of an inch or more than two inches square, the duty shall be one-half of 1 cent per pound. On bar iron, consisting of flats less than three-eighths of an inch or more than two inches wide, and rounds more than two inches thick, or less than one inch or more than three-fourths of an inch or more than two inches square, the duty shall be three-fourths of 1 cent per pound. All iron in slabs, blooms, loops, or other forms less finished than iron in bars or more advanced than pig iron, except castings, shall be rated as iron in bars and shall pay duty accord-

ingly, and none of the above shall pay less than 20 per cent. ad valorem. Mosaic iron made from sand ore by one process shall pay \$10 per ton. Iron bars for railroad or inclined planes, 55 cents per 100 pounds. Boiler or other plate iron, not less than three-sixteenths of one inch thick, three-quarters of 1 cent per pound. All band, hoop, and scroll iron from one-half inch to six inches wide, under one-eighth inch thick, and not thinner than No. 20 wire gauge, one-quarter of 1 cent per pound. All band, hoop, and scroll iron thinner than No. 20 wire gauge, 1 cent per pound. Slit rods, three-quarters of 1 cent per pound. All other descriptions of rolled or hammered iron, not otherwise provided for, three-quarters of 1 cent per pound. Iron squares, worked on one side, 2 cents per pound, and in addition 15 per cent. ad valorem. All other squares of iron or steel, 4 cents per pound, and 15 cents ad valorem. All manufactures of steel, or of which steel shall be a component part, not otherwise provided for, 25 per cent. ad valorem; but all articles of steel partially manufactured, or of which steel shall be a component, not otherwise provided for, shall pay the same rate as if wholly manufactured. Steel railroad bars, three-quarters of 1 cent per pound, and metal converted, cast, or made from iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as steel. Cast iron of every description shall pay \$3 per ton. Wrought-iron of every description, \$4 per ton; but nothing shall be deemed scrap iron except refuse or iron that has been in actual use and is fit only to be remanufactured. Steel in ingots, bars, coils, sheets and steel wire, not less than one-quarter of an inch in diameter, valued at 7 cents per pound, or less, shall pay 1 1/4 cents per pound; valued above 7 cents, and not above 11 cents, 1 1/2 cents per pound; valued at above 11 cents per pound, 2 cents per pound and 5 per cent. ad valorem. Steel in any form not otherwise provided for, 15 per cent. ad valorem.

NEW PUBLICATIONS.

MILLS' DIRECTORY OF STEAM BOILER AND ENGINE OWNERS, ENGINEERS AND STEAM USERS IN NEW YORK AND BROOKLYN.

This little volume is the fruit of a series of annual publications issued by James N. Mills, 165 Broadway, N. Y. It contains the names of over 6000 boiler owners and engineers in the cities of New York and Brooklyn, and is intended to be a directory of this class of people for 1879-80. Its correctness and completeness we have no means of determining, but we are assured by those interested that it is carefully and conscientiously prepared, and we have no doubt it will be of value to those needing such a list for business purposes. The same publishers announce as in press a "Directory of Manufacturers, Boiler Owners and Steam Users in the New England States," which is promised to contain the names of owners of every establishment where steam power is used for manufacturing and other purposes.

ANALYSES NOTE BOOK. By Prof. W. B. Potter. Washington University, St. Louis.

Prof. Potter's "Analyses Note Book" is in many respects similar to Whitwell's well-known "Iron Master's Pocket Book," from which it is distinguished chiefly by its extreme simplicity. It is a collection of blanks for the recording of the results of analyses of fuel, fire clay, bricks, &c., limestone, iron ores, iron and steel, miscellaneous ores and metals, slag, building stone, water and petroleum, the number of pages assigned to each being approximately distributed in reference to the importance of each.

To chemists, managers and students it will be valuable, as it offers, in a complete and convenient form, a cheap memorandum book for analyses and assays.

A correspondent writes to the London Times: "Will the electric light ignite the gases which cause explosions in coal mines? If it will not, then it is clear that no other light ought to be allowed to be used in working collieries. But even if, under certain circumstances, it would ignite some of these gases, it still possesses the advantage that a very few lamps, under effectual control and supervision, would suffice to illumine a seam for working purposes instead of the 77 lamps, under little or no control or supervision, that is stated to have been given out to the colliers of the Lady Fair Pit of the Leycey Colliery, of whom over 60 have been killed by another of those frequent explosions which annually cost this country so many hundreds of lives. It may be said that the electric light is not yet perfected. Possibly not, but it may be seen daily burning in many parts of London, and it would be satisfactory to know whether the government inspectors or those privately interested are taking any steps to test the safety and applicability of the electric light to coal mining, and, if found suitable, to enforce its early and general introduction."

Some millions of dollars are being invested in pier and dock improvements, grain elevators, &c., on the New Jersey side of the North River, in confidence that an enormous shipping interest will be concentrated all along the river front at no distant day. The latest movement is in the reconstruction, by the Pennsylvania Railroad Company, of what is known as the old Cunard docks, nearly all the piles having been driven for a pier 130 x 530 feet, to be occupied by the Red Star Steamship Company as soon as it is finished. The great grain elevator for this company, calculated for about 1,500,000 bushels, is now well advanced, and will be finished in season for the fall business. The wooden (timber) walls for the Erie Railway Company are nearly finished to the roof, hundreds of men being employed on the work, the top of the structure appearing to be covered with them. The Delaware, Lackawanna and Western Railroad is also building extensive coal docks.

Smoke in Cincinnati.

An organization known as the Ladies' Association of Cincinnati have sent to the Board of City Commissioners the following pathetic memorial:

"To the Board of City Commissioners: The association of ladies for the promotion of the cleanliness of the city beg leave to again call the attention of your board to the subject of smoke consumption at the City Water Works.

"Since we last submitted our views to your board the Jury Reports of the Cincinnati Exposition have been published, and it has been thus publicly made known that there are at least five or six methods of consuming the smoke in steam furnaces which are thoroughly practical and economical. Some of these can be adapted to ordinary steam boilers at so trifling an expense that there can be no reasonable obstacle to their general use.

"The possibility of rescuing our city from the reproach of being one of the dirtiest of the world has, therefore, passed from this condition of doubt or of experiment to that of complete and proven feasibility. What is needed is that this should be brought to the attention of private manufacturing establishments by prominent public examples in successful operation.

"It has been proven that a large economy in fuel may be made, besides saving the city from the defilement of great clouds of soot, if your board will direct one of the several successful smoke consuming devices to be applied to the furnaces of the water works under your control.

"We therefore again appeal to you to comply with the general wish of the citizens of Cincinnati, and set the example of a hearty effort for a reform which alone would make the city one of the most attractive on the continent.

"We hand herewith a copy of the report of the jurors and committee of the Exposition showing the complete success, economy and business advantages of the several devices passed upon by them.

We fear that the dear ladies have availed themselves of their right to "jump at conclusions" in this matter. Probably they will never learn that to consume smoke is practically an impossibility. The solution of the problem depends wholly upon the completeness of the combustion, which is not easily secured with a durable construction for soft coal. This is a many-sided problem, and its solution will never be reached by the simple expedient of "be it enacted" or "resolved."

Special Notices.

SECOND-HAND

Machinists' Tools.

One 25 in. x 45 in. Corlies Engine.
One Engine Lathe, 50 in. x 20 ft. Ames, new
One " " 60 in. x 20 ft., good as new.
One " " 37 in. x 24 ft. Pond, nearly new.
One " " 36 in. x 12 ft. Ames, new.
One " " 30 in. x 20 ft., good order.
One " " 30 in. x 10 ft. Wheeler, new.
One " " 26 in. x 14 ft. Wheeler, new.
One " " 26 in. x 13 ft. Heavy, fair order.
One " " 21 in. x 14 ft. Pond, nearly new.
One " " 20 in. x 6 ft. Wheeler, A. 1.
Five " " 20 in. x 10 ft. Lincoln, new.
One " " 19 in. x 7 ft. Walcomb.
One " " 16 in. x 8 ft. Wheeler, good order.
One " " 14 in. x 6 ft. Lathe & Morse.
One Chucking Lathe 26 in. x 25 ft. Lathe & Morse.
One Mand Lathe, 20 in. x 8 ft. Wheeler.
Two " " 20 in. x 10 ft.
Six " " 11 in. x 45 ft. Spencer, New.
Four " " 7 in. x 24 ft. " "
One Planer, 30 in. x 6 ft. Wheeler, A. 1.
One " " 27 in. x 6 ft. Niles, new.
One Shaper, 6 in. stroke. Gould.
One No. 3. Garvin Miller, new.
One 24 in. Pattern Milling Machine.
Two 24 in. " " self feed, Ames, new. [new
One 24 in. " " Pratt & Whitney; A. 1
One 10 in. " " Blaisdell.
One each P & W. No. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
Three Sensitive Drills, drills to 3-10 in. hole. [Drill.
One No. 1. Wilder Punch Press, new.
One each No. 1 & 4. Wilder Punch Press, Geared, new.
One each No. 2 & 3. Wilder Punch & Shear Geared, new.
One Pratt & Whitney Profiling Cutter, new.
One H. P. Baxter Engine.
Six Stephens Vices.
Belting, Shafting and Miscellaneous Machinery.
E. P. BULLARD, 14 Dey St., New York.

WANTED—A situation as Rolling or Puddling Mill Manager, by a thoroughly practical man. Has had 25 years' experience in the iron trade, and several years as manager. Can give references as to character and ability. Address J. WESTON, Troy, N. Y.

A Bargain.

I offer for sale at a bargain, my house, storehouse, workshop, and complete stock of general Hardware. Fine opportunity for a live man. Country fine and attention rapidly.

J. S. WHEELER,
Laverne, Minn.

For Sale.

A desirable business consisting of Hardware, Stoves, Bar Iron &c. Established 20 years in one of the best towns on the Hudson river. Capital required from \$4000 to \$8000. Owner has other business.

Address HARDWARE, Box 17,
Office of The Iron Age, 33 Reade St., New York.
\$10,000 to \$20,000 Offered for Investment.

A live young business man, with excellent credit and reputation, would invest from \$10,000 to \$20,000, and take an active part in some respectable mercantile or manufacturing concern. Business must be established and bear closest investigation. State real name, nature of business and brief particulars or no attention paid. R. B. W.
Office of The Iron Age, 33 Reade Street, N. Y.

WANTED—Two Machines of most approved character, for Punching Eyes in Axes. Address, with particulars, M. C.

Special Notices.

SECOND-HAND
and NEW TOOLS
FOR SALE LOW.

February List No. 2.

Miscellaneous Second-Hand Tools.

All in Good Order, and will be sold very low
One Engine Lathe, 24 in. swing x 12 ft. bed.
One Engine Lathe, 28 in. swing x 14 ft. bed.
Seven Engine Lathes, 18 in. swing x 7 1/2 ft. bed.
(Chain-feed Lathes)
One Horizontal Boring Lathe.
Two Wood-Turning Lathes.
One Cement Double-Pulley Lathe.
One Planer, 30 in. x 7 ft. chuck, &c.
One Planer, 72 in. x 66 in. x 24 ft.
Two Planers, 22 in. x 5 ft.
One Four-Spindle Drill.
Three Bolt Cutters, various sizes.
One No. 2 Bolt Cutter.
One new "Hardaway" Bolt Heading Machine, to head up to 7/8 in. bolts.
One new "Hardaway" Bolt Heading Machine, to head up to 1 1/4 in. bolts.
A lot of Wood Working Machinery.
One Engine Lathe, 24 in. swing x 10 ft. bed.
Two Profiling Machines, Two Spindle.
One Hydraulic Car Wheel Press.
One Large Punching Press.
Five Medium Punching Presses.
Six Small Punching Presses.
One N. Y. Steam Engine Co. Roll Cutter, 1/2 in. to 1 1/4 in.
One N. Y. Safety Steam Power Co. Upright.
13 H. P. Engine, and 20 H. P. Upright Boiler with all connections, &c.

NEW TOOLS, Very Low.

Five No. 2 Bolt Cutters, Wood & Light.
One No. 1 Bolt Cutter, with center, Wood & Light.
Three No. 2 Bolt Cutters, with center, Wood & Light.
One Engine Lathe, 26 in. swing, x 16 ft. bed.
One Planer, 30 in. x 4 ft.
One 26 in. swing Upright Drill, not back geared.
Two 26 in. swing back geared and self-feed Upright Drills.
Please specify which of the above tools you want and we will forward all particulars.

STEAM LAUNCH,

40 ft. x 7 ft.; draws 3 ft.; Engine, 5 1/2 x 9; Boilers, 32 x 48. Fitted with carpets, &c., for pleasure.

A Woodruff & Beach
Beam Engine,

Low pressure, 42-inch cylinder, 84 inch stroke, with fly-wheel pulley 20 feet diameter, 36 inch face, and

Four Tubular Boilers,

60 inches in diameter, 20 feet long, and all connections practically as good as new.

The Geo. Place Machinery Agency,
121 Chambers and 103 Reade St.,
NEW YORK.

FOR SALE.

As a whole, or in parcels, 27,000 acres of Virginia agricultural and mineral lands, on James River, about 30 miles from Lynchburg. The ores are hematite and specular. There is one iron blast furnace on the property. Possession will be delivered to the purchaser without delay. Address the undersigned.

FRANCIS T. ANDERSON,
Court of Appeals, Richmond, Va.

For Sale or Lease.

FOUNDRY,
NEW YORK CITY.

The plot of ground (Excelsior Works) measures 275 ft. frontage by 100 feet deep. It has a splendid Foundry, 60x165 feet, with cupolas, cranes, &c. If leased, additional buildings to any extent will be erected to accommodate any kind of manufacturing business. Apply to WM. J. FRYER, Jr.,
Etna Iron Works, 104 Goerck Street.

ELIZABETHPORT ROLLING MILL,
Elizabethport, N. J.,Common and Refined
BAR IRON,
Fish Plates, Spikes, &c.

Address,

DANIEL W. RICHARDS & CO.,
Importers of and Dealers in Scrap Iron and Metals,
88 to 96 Mangin St., New York.

FOR SALE.

THREE FIRST-CLASS CHARCOAL IRON FURNACES, with 9000 acres of IRON and TIMBER LAND to each furnace. Prices, \$60,000 for one, the other two for \$225,000.

Address J. H. BRISTOL, Agent,
Martinsburg, W. Va.

THE UNDERSIGNED have this day formed a partnership under the firm name of Spaulding, Jennings & Co., for the manufacture of Steel.

T. H. SPAULDING,
R. E. JENNINGS,
P. I. FITZSIMON.
New York, February 3, 1880.

For Sale.

Christiana Rolling Mill Property, situated on the south side of Christiansa Creek, Wilmington, Del. Main building, 90 x 230 feet, containing two trains of Rolls 30 x 56 inches, and 26 x 72 inches. Complete in all its appointments for a first-class Plate Mill. Or, will sell an interest to a person having capital, experience and capable of conducting the business. Apply to
LOBDELL CAR WHEEL CO.,
Wilmington, Del.

A Practical Furnace Manager and Superintendent wishes a situation to run one or more furnaces. Best of references as to character and ability. Address M. C.
P. O. Box 3512, New York City.

Special Notices.

DON'T BUY

MACHINERY

Of any kind

UNTIL YOU WRITE TO US

for our List No. 20, containing full description, with prices, of over 2000 New and Second-Hand Machines, such as

MACHINE TOOLS,
BLACKSMITH TOOLS,
WOODWORKING MACHINERY,
STATIONARY AND HORIZONTAL
ENGINES AND BOILERS,
PORTABLE ENGINES,
HOISTING ENGINES,
CAR MACHINERY,
WATER WHEELS,
COTTON AND
WOOLEN MACHINERY,
SAWS,
STEAM PUMPS, &c., &c.

We offer the largest collection ever in the hands of ONE FIRM before, and at

PRICES FAR BELOW THEIR TRUE VALUE.

Enclose stamp and state fully just what Machine or Machines you are in want of. Address

S. C. FORSAITH & CO.,
MACHINISTS,
AND GENERAL MACHINE DEALERS,
MANCHESTER, N. H.

MENGIS & CO.,
BANKERS

AND

Railway Commission
Merchants.

Dealers in all kinds of

Scrap, Wrought and Pig Iron,
Old Rails and Car Wheels,

NEW STEEL AND IRON RAILS A
SPECIALTY.

We have established the above house for the purpose of doing a general Railway Commission business. We negotiate the sale of Railroads (or the controlling interests), and effect consolidations and reorganizations.

We also import direct from different European ports all grades of Iron, Pig, Bessemer Steel, Old Rails, &c.

We sell Locomotives, Passenger, Flat and Box Cars at manufacturers' prices. Any business in our line we respectfully solicit a share of, always endeavoring to promote the interests of our customers. All orders, either by telegraph or mail, promptly attended to.

Mengis & Co.,
43 Pine St.,
NEW YORK.

Post Office Box 154.

Cable address, "MENGIS, New York."

FOR SALE,

FIRST-CLASS RETAIL HARDWARE STORE

On one of the principal streets. About \$3000. New stock. Address E. F.,
Office of The Iron Age, 220 S. 4th St., Phila., Pa

Sanderson Bros. Steel Co.

A limited number of shares for sale by
EDWARD FRITH & SON,
241 Pearl Street, New York.

For Sale.

An interest in a well-established Machine Works and Hardware Manufacturing, doing a large and increasing business, well situated within 80 miles of New York, with direct communication by water or rail. Capital required, from \$5000 to \$10,000. For further particulars address, with reference, S. M. C.,
Office of The Iron Age, 33 Reade St., New York.

WANTED—By a young man, an engagement as general Salesman in a reliable Hardware house; eight years' experience with one firm. Would take an interest in a promising business. West preferred. Best of references. Address HARDWARE,
P. O. Box 285, Hartford, Conn.

Special Notices.

A. J. STEINMAN, Chairman. W. B. MIDDLETON, Supt.
W. G. MENDENHALL, Sec'y & Treas.

OFFICE OF

PENN IRON COMPANY, Limited,

MANUFACTURERS OF

Merchant Bar Iron, Hammered and
Rolled Axes, Car Forgings, Bridge
Work, Fish Joints, Bolts, R. R.
Spikes, Bolt Ends, &c., &c.,

LANCASTER, PA.

FOR SALE.

One large Planer, 25 ft. long, 5 ft. square, built very heavy, in first class condition. Also, Shafting and Pulleys, and one large Cupola and one large Foundry Crane, all in good condition and for sale cheap. Address

PENN IRON CO., LIMITED,
Lancaster, Penn.

PRICE BOOKS.

Full Leather, \$7.50. Half Leather, \$6.50.
Pocket Edition, Full Leather, \$3.50.

DISCOUNT. Screw List, 50 cents.
Leigh's Discount Book, 50 cents.

Buell Lamberson, 97 Chambers St., N. Y.
For sale at publisher's prices by Wm. Blair & Co., Chicago; A. F. Shippleigh & Co., St. Louis; C. B. James, Detroit.

LEIGH'S
Discount Book.

Hardware Buyers will find this book particularly valuable. Shows at a glance the net of any discount or combination. Also contains computing tables for quickly and accurately reckoning discounts. Indexed so any table can be referred to instantly without turning a leaf or wasting a moment.

Bound in Leather. Price, \$1.00
Cloth. Price, .50

Address
EDWARD B. LEIGH,
St. Louis Elevator, St. Louis, Mo.

IVISON, BLAKEMAN, TAYLOR & CO., New York.

For Sale.

The valuable Iron Ore property of the Wayne County Mining Company, situated in Wayne Co., N. Y., on the line of Lake Shore division of Rome, Watertown & Ogdensburg R. R., with tracks and branches leading to the mines. This property extends over four miles along said road, and nowhere over half a mile from it, and contains over two millions of tons. It is now in full operation and shipping from 100 to 200 tons per day, and is capable of doubling that amount. It is only 17 miles from port of Genesee, one of the best harbors on Lake Ontario, with ample dock room for shipping by lake. For further particulars, address
J. E. ELLIOTT, Sec'y,
Clinton, Oneida Co., N. Y.

Bissell & Welles,
Wholesale Hardware Auctioneers,
83 Chambers and 65 Reade Sts., N. Y.
Sales held weekly for the trade. Consignments solicited. We refer to the leading Manufacturers and Importers.

FOR SALE.

A medium sized Alden Ore Crusher. Used only a short time, and in good order. Address
M. R. JOHNSON,
47 Fourth Ave., Pittsburgh.

JOHN R. WHITLEY & CO.,
European Representatives of First-
Class American Houses,
WITH
FIRST-CLASS AGENTS
IN THE
Principal Industrial and Agricultural
Cities and Centers of Europe.

TERMS ON APPLICATION,
LONDON, PARIS,
7 Poultry, E. C. 8 Place Vendome.

The Sherman Process Co.
9 Pemberton Square, Boston, Mass.,
Issue Licenses to use the Process for the
Manufacture of Iron and Steel
In the Bessemer Converter, Crucible, Siemens-Martin, Puddling, Blast and Cupola Furnaces.

The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working. See page 17 of The Iron Age of Oct. 25th, 1877.

For Sale.

Stock of hardware, stoves and implements, and store furniture, in one of the best towns in Kansas. Address
HARDWARE,
Box 266, Salina, Kansas.

FOR SALE.

100 tons T Rails, 45 lbs. per yard, fit to relay.
50 tons 12 in. I Beams.
30 tons 1 1/2 in. Rounds.
30 tons 9 in. Deck Beams.
20 tons 4 1/2 in. Rounds.
From Elevated Railroad of N. Y. Apply to
A. & T. ROBERTS & CO.,
265 South 4th St., Philadelphia.

WANTED—By a young man, a situation in the Hardware or Iron business. Has had 14 years' experience as clerk and practical workman. Salary moderate; references given. Address
Office of The Iron Age, 33 Reade St., New York.

AN EXPERIENCED HARDWARE man, fifteen years in one large house in this city. Was bookkeeper, cashier, stock buyer, salesman and one of the managers. Open for any position at a moderate and reasonable salary. First-class city references. Address
HARDWARE, Station L, New York City.

Special Notices.

TO DEALERS IN IRON.
SEALED PROPOSALS, endorsed "Proposals for Iron," will be received at the office of the undersigned, 78 Broad Street, Newark, N. J., until Wednesday, the 25th day of February, A. D. 1880, at 12 o'clock noon, for the purchase of old material, now in his hands as Receiver, appointed in a cause pending in the Court of Chancery of New Jersey, wherein Hugh J. Jewett, Receiver of the Erie Railway, is complainant, and Henry Bowman and Sigmund Dringer are defendants.

Said materials consist of about
130 tons Car Wheels,
85 tons Cast Iron Scrap,
65 tons Wrought Iron Scrap,
172 tons Car Axes,
25 tons White Metal,
25 lbs. Copper and Brass Scrap,
225 feet Leather and Rubber Belting, assorted,
104 Belting Scrap.

6 Copying Presses. Now on the premises formerly occupied by Sigmund Dringer, Van Houten and Prospects Streets and Broadway, and yard near Erie Rail way, Paterson, New Jersey, where the same can be inspected.
The right is reserved to reject any and all bids not deemed advantageous or satisfactory. On such bids as may be accepted awards will be made on the 5th day of March, 1880, when a payment of 15 per cent. of the amount of the award will be required; the balance 85 per cent. to be paid on or before the 20th day of March, 1880. Materials will be sold by quantities as already ascertained, and must be removed within 10 days after the date of sale. Several lots can be had on application at the storehouse, corner of Jouten and Prospect Streets, Paterson, N. J., or will be sent by mail on request to the undersigned,
E. N. MILLER, Receiver,
78 Broad St., Newark, N. J.

Pipe Mill for Sale or Rent.

The above property is situated at Middletown, Dauphin Co., Pa., nine miles east of Harrisburg, on the Pennsylvania Railroad, with which it is connected by a siding. The building is brick, with a slate roof; size of main building, 105 by 55 feet; engine house, 30 by 36 feet, and a 78-foot stack. A frame pipe shed runs the whole length of building. There are two welding furnaces and one scarp furnace, with room for as many more; a sixty-horse-power engine; eighty-horse-power tubular boiler, and all machinery necessary to run a pipe mill. Machine shop and machinery are on the second story of engine house. Engine boiler and all machinery are in first class condition, and the entire works are in good repair and could be started at a very small expense. There is also a frame office 24 by 16 feet about fifty feet from mill, with large farrel & Herring safe, letter press and office furniture. This property will be sold at a low price, and on the most advantageous terms to purchaser, or will be rented very reasonably. For further particulars apply to
JAMES YOUNG,
Middletown, Dauphin Co., Pa.

Patterns! Patterns!! Patterns!!!

\$50,000 Worth of
MACHINERY PATTERNS FOR SALE,
In Lots and at Prices to Suit Purchasers.

ENGINE PATTERNS IN GREAT VARIETY,
Including a half dozen or more for Tug Boats, Boiler Heads, Pumps (Water, Fyrup, &c.), Lathes, Planers, Slotters, Sugar Mills, an Excavator, Gear Wheels, Grate Bars, and a great variety of others. Also

1 Large and 2 Small Cranes, 3 Boilers,
Work Benches, Wood Screws, Crucibles, Slotter, Iron Safe, Steam Gauge, Condenser, Sieves, Emery Wheels, Cases of Drawers, &c., &c.
Come and see them.

R. FRAZIER, Agent,
Bordenstown, N. J.

JOHN E. SWAN & BROTHERS,
IRON MERCHANTS,
Glasgow and Middlesbrough,
Exporters of all brands of

Scotch & English Pig Iron.

c. f. i. to America and f. o. b. British ports.

Old Iron Rails, Puddled Bars
AND MANUFACTURED IRON.

TO MANUFACTURERS AND CAPITALISTS.

FLOWER PINS.
PATENT FOR SALE.

Address
J. H. PLUMMER,
1276 Pacific Street, Brooklyn, N. Y.

TRUSTEES' SALE OF VALUABLE IRON PROPERTY.—Two New Charcoal Blast Furnaces, Forty-Four Thousand Acres of Valuable Land.—Pursuant to a mortgage executed by James Woods, Jr., Yeoman and James Woods, Jr., registered in the Register's Office of Stewart Co., Tennessee, in book 24, pages 410 to 490, inclusive, the undersigned will sell on the premises, for cash, on the 31st day of March, 1880, that very valuable iron property located in Stewart County, Tennessee, known as the Stewart Iron Works. Parties wishing fuller information will please address the undersigned, care of Third National Bank, Nashville, Tenn.
TEMPLE O. HARRIS, Trustees.
V. L. KIRKMAN,

ASTONISHING POWER
IN
PUNCHING & SHEARING PRESSES.

See our illustrated advertisement on next to last page of this paper.

PEERLESS PUNCH AND SHEAR CO.,
52 Dey Street, New York City.

For Sale.

23 in. x 48 in. CORLISS ENGINE.
Can be seen running. Will be delivered later part of this month. Also 18 in. x 42 in. Hewes & Phillips. Can be delivered at once.
E. P. BULLARD,
14 Dey St., New York.

FOR SALE,

Job Lots and Bankrupt Stocks Hardware.
Great bargains offered to the trade.

A. W. WHEELER,
141 Lake St., Chicago,

FOR SALE.

20 H. P. Locomotive Boiler; 35 and 40 H. P. Horizontal Tubular Boilers; 15 and 20 H. P. Vertical Boilers; 10 x 20, 11 x 18, 12 x 24 Horizontal Engines; Pair 6 x 10 inch motion Engines; 3 large Steam Pumps; 20 Small Pumps; 10 Sturtevant Pumps; 3 Submersibles; 2 Siphons; Crank Planer; Portable Drill; 48 in. Cement Car-wheel Borer; Suspension Drill; Chuck Lathe; 30 in. x 20 ft. Sellers Lathe.
A. G. BROOKS & WINEBRENER,
261 N. Third street, Philadelphia.
See Circulars.

IMPORTS

Of Hardware, Iron, Steel and Metals into
the Port of New York, for the Week ending
Feb. 17, 1880:

Hardware.		New York National	
Acker, Merrill & Condit,		Banking Co.	
Corking machine, 1		Hoops, bbls., 9005	
Arnon & Wilkins,		Ogden & Wallace,	
Guns, cs., 9		Sheet iron, bbls., 350	
Berbeck & Co.		Sheets, 316	
Hdw., cs., 3		Phelps, Stokes & Co.	
Bloomfield J. C. & Co.		Pig, tons, 100	
Machinery, pkgs., 34		Sheet iron, bbls., 1212	
Baker, Hermann & Co.		Bar iron, bbls., 419	
Hdw., cs., 27		Sheets, 289	
Hdw., csks., 16		Swift H. H. & Co.	
Charles R. P.		Scrap, bbls., 368,200	
Grinding stones, 10		Wilson & Co.	
Child Theo.		Pig, tons, 200	
Aucher,		Order.	
Copcutts W. H. & Co.		Bars, 11,599	
Machinery, cs., 1		Bundles, 2751	
De Rivera J. & Co.		Casks, 22	
Machinery, piece, 1		Cast iron, a lot,	
Degraw, Aymar & Co.		Cast iron, cs., 412	
Chains, 2		Galvanized iron, cs.,	
Du Vivier & Co.		60	
Machinery, cs., 1		Hoop iron, bbls., 602	
Du Witt Wire Cloth Co.		Old car springs,	
Mdse., pkgs., 1		tons, 20	
Farling Corbett,		Old cast iron, tons,	
Hdw., cs., 16		124	
Field Alfred & Co.		Old iron, tons, 1238	
Hdw. and hoes, 9		Old railroad iron,	
csks. and 1 cs.		a lot,	
Folsom, H. & D.		Old rails, kilos., 427-	
Arms, cs., 12		544	
Franklyn C. G.		Old rails, pcs., 4920	
Mdse., pkgs., 1		Old rails, tons, 3678½	
Hdw., cs., 1		Old wire rigging,	
Furness, Bannister & Co.		tons, 17½	
Hdw., cs., 1		Pig, tons, 6905	
Hepworth S. S. & Co.		Plates, 866	
Machinery, bxs., 4		Railroad iron, bars,	
Cast-iron wheel, 1		4494	
Heyden & Co.		Rails, 4516	
Hdw., cs., 1		Rod iron, lots, 744	
Hoe R. & Co.		Scrap, tons, 1688½	
Mdse., pkgs., 1		Sheet iron, bbls.,	
Julliard A. D. & Co.		2770	
Machinery, cs., 15		Tin sheet iron,	
Livingstone W. F.		cs., 28	
Grinding stones, 56		Wire rods, pkgs., 12-	
Lockwood A. J.		916	
Anvil, 1			
Files, csks., 3			
Mason John W.			
Wire rope, coils, 50			
Moore Henry,			
Files, csks., 8			
Files, cs., 8			
Morris L. W.			
Cartridges, cs., 1			
Mount J. T.			
Hdw., cs., 2			
Hdw., csks., 2			
Park & Tilford,			
Corking machine, 2			
Pim, Forwood & Co.			
Machinery, pkgs., 4			
Ranft Richard,			
Steel wire, cs., 1			
Rogers H.			
Mdse., pkgs., 2			
Showering, Daly &			
Gales,			
Mdse., pkgs., 11			
Hdw., cs., 2			
Hartley & Graham,			
Mdse., pkgs., 1			
Stearns John M. & Co.			
Machinery, cs., 4			
Strasburger, Pfeiffer &			
Co.			
Hdw., cs., 1			
Struller, Lou & Co.			
Arms, cs., 14			
Gun stocks, 50			
Thornton J. & Co.			
Hdw., cs., 1			
Tillotson L. G. & Co.			
Galv. wire, lots, 195			
Ward Asline,			
Hdw., cs., 1			
Webster J.			
Grindstone, 1			
Wetzel M.			
Mdse., pkgs., 6			
White John S.			
Machinery, cs., 4			
Wiebusch & Hilger			
Hdw. Co.			
Cutlery and anvils,			
pkgs., 177			
Wilson E. B.			
Wire, csks., 1			
Order.			
Coal, tons, 401			
Emery stone, ton, 255			
Files, csks., 13			
Guns, cs., 4			
Machinery, cs., 4			
Tubes, bbls., 12			
Wire, coils, 717			

Iron.

Baring Bros. & Co.			
Pig, tons, 773			
Hoop iron, bbls.,			
2012			
Scroll iron, bbls., 815			
Wire rods, pgs., 4105			
Coddington T. B. & Co.			
Sheet iron, bbls., 159			
Drexel, Morgan & Co.			
Railroad bars, 3685			
Elliot, Sons & Co.			
Ore, tons, 420			
Geisenhelter & Co.			
Cast iron, cs., 50			
Irwin Richard & Co.			
Pig, tons, 300			
Lee Jan. & Co.			
Pig, tons, 414			
Mayer Bros. & Co.			
Old rails, pcs., 6416			
Pig, tons, 450			
Nevada Bank,			
Pig, tons, 800			

PHILADELPHIA.

Office of The Iron Age, 230 South Fourth St.,
PHILADELPHIA, Feb. 17, 1880.

Pig Iron.—We have to note further symptoms of weakness in Pig Iron, and reports are current of lots being offered at a material decline from nominal quotations. It is difficult to obtain particulars, however, and still more difficult to form any definite idea in regard to the immediate future of the market. The leading furnaces appear to be strong, although not asking as high figures as they were some time ago, the average reduction being about \$1 per ton, although weakness is not so much among producers, as in lots held in second hands. There are a few companies, however, whose iron is not much known among consumers, and they are said to be offering at about \$36 for Forge, \$37.50 for No. 2, and \$39 for No. 1, all furnace delivery; in fact, we have heard of its being offered \$1 less in some instances without leading to business. Others claim to have buyers on hand for all they can make, at \$1 @ \$2 higher figures than the above, but refuse to increase their engagements, even at outside prices. The market is so thoroughly mixed that we can only present the views held by the trade, and leave parties to judge for themselves in regard to the ultimate result. The majority seem to anticipate higher prices. They claim that the consumptive demand will necessitate a heavy production, and as ores are scarce and dear, if not further advanced they will at least maintain their present value; therefore Pig Iron will rule high. It is confidently predicted that the English market will be much higher, as the increased demand upon it so far has been confined

almost exclusively to the United States. The revival of trade is believed to be world wide, and as soon as other countries (not yet affected) fall into line, it is thought the advance in England will be more rapid than it has been hitherto, that market being the objective point for all new orders. The older merchants also fall back on their previous experience, which, they say, after a long depression has always shown a somewhat corresponding period of prosperity. They claim, therefore, that if for no other reason, that of itself is sufficient to warrant the expectation of extreme rates during the balance of 1880. This view is supported by the well-established fact that every interest connected with the iron trade is now in a prosperous condition. Not only the large establishments, but every little country shop is full of work; blacksmiths, wheelwrights, wagon builders and similar trades are steadily eating their way into stocks, which would soon be entirely gone if not constantly replenished by such an aggregate of imports and production as the country has never known in previous times. These views appear to be well founded, so that any little weakness for the time being carries no alarm to the trade generally. It is conceded, however, that Pig Metal is relatively the dearest article in the market, and moderate concessions are regarded as very desirable. There is too much margin between American and foreign Pigs, and there is little doubt but it will have to be narrowed in some way. The comparatively high rates quoted here render this a conspicuous point for shipments, and in case of decline abroad, there is little doubt that enormous quantities would be unloaded in the United States at some price. This, at present, is the weak spot, and prices are too much under influences from outside sources to warrant very confident predictions as to the immediate future, and to this, in a measure, we attribute the feverish and unsettled condition of the market. It is likely, however, that values are settling down to a safe point, which, when established, will doubtless lead to a very active demand. In the meantime we quote: No. 1 Foundry, \$40 @ \$42; No. 2 Foundry, \$39 @ \$40; Gray Forge, \$38 @ \$40; North of England Irons, \$32 @ \$34; Eglington, \$35; Gartsherrie, \$37 @ \$38; the latter quotations are for small lots from store; lots to arrive are quoted at about \$3 7/8 to less money. Bessemer Irons are decidedly weaker, and holders appear to be pressing sales at \$2 @ \$3 1/2 ton below the rates asked some time ago.

Muck Bars.—There has been much business closed during the week, but buyers are prepared to pay \$63 for a good article; holders are firm at \$65.

Structural Iron.—The market is stronger, and manufacturers are asking more money than they were a week ago. An order for several thousand tons of shapes has just been placed for the elevated railway in Brooklyn, and as there are improved prospects in other directions, prices may be advanced at an early date. There is a good deal of inquiry, and the mills are pretty well filled up with orders, so that a satisfactory business in this department seems assured. Angles are quoted at 4¢ @ 4.25¢; Beams, Channels and Tees, 4.6¢ @ 4.75¢.

Plate and Tank Iron.—There is a fair business going, but nothing especially urgent, and prices are not fully maintained. Orders are expected to be more numerous in the course of a few weeks; but there is an impression that foreign iron will be brought here if manufacturers insist on extreme rates. We quote same as last week, but concessions have been made in some cases to the extent of \$4 @ \$6 7/8 ton. The demand for Skelp Iron has been very active; orders for 5000 tons having been placed during the week at about 4¢ @ 4.25¢. The following are figures asked to-day, viz.: Tank, 4.5¢; C. No. 1, 4.7¢; C. H. No. 1 Shell, 4.9¢; Flange, 6 1/2¢; Flange Fire-Box, 7 1/2¢; Best Bloom, 8¢.

Sheet Iron.—The market is firm, and a moderate business has been done during the week. Manufacturers are fairly supplied with orders, and show no disposition to grant concessions from quoted rates. The outlook seems to indicate a heavy demand for Sheet Iron, although some large buyers are holding off, in anticipation of placing orders to better advantage later on. In the meantime we continue last week's quotations as follows:

Common Sheet, No. 25 to 28.....	6 1/2¢
Best Bloom Sheet, No. 25 to 28.....	6 1/2¢
Best Bloom Sheet, No. 22 to 25.....	6 1/2¢
Best Bloom Sheet, No. 16 to 21.....	8 1/2¢
Common Red Plates, 3-16 to 16.....	4.6¢
Blue Annealed, 2-16 to 16.....	4.7¢
Best Bloom Galvanized, discount.....	List price
Second quality, discount.....	10%

Bar Iron.—There is a good demand for Bars, but it is difficult to obtain over 3.8, at which price dealers are selling from store lots purchased before the advance. This causes a good deal of irregularity in prices, as orders cannot be placed at the mills to any extent for less than 4¢. The result is that merchants and importers are doing most of the business, although the mills are busy on sizes not carried in stock. There is a liberal supply of orders, however, and no complaints of dullness from any source, so that there are strong reasons for expecting that 4¢ and upward will be the regular quotation soon as old purchases are exhausted.

Steel Rails.—There is no change to note. Prices are firm, and sales during the week have all been on a basis of \$85 and upward, at mill. The demand is heavy, and there is no doubt it will continue so for a considerable period. We are informed that \$83 has been bid for a large quantity of Rails to be rolled from imported Blooms. For the latter \$55 is bid and \$62 asked. Business could probably be done at medium rates.

Iron Rails.—Business during the week has been very quiet, and we have not heard of a single sale of any magnitude. Holders are firm, but it is claimed that they are not insisting on the very extreme rates quoted a couple of weeks ago. The mills are tolerably well supplied with orders, however, and are not likely to reduce their quotations, unless in proportion to a decline in raw material. As a rule, higher prices are looked

for toward spring; but this will, no doubt, be controlled by the course of events in foreign markets. Heavy sections are quoted \$67.50 @ \$70, with light Rails up to \$77.50. Market quiet.

Old Rails.—Prices are easier, and sales have been made at a slight decline from rates current last week. The supply is not heavy, nor are holders urgent to realize, unless at something near the old rates. Sales have been made at \$42.50, \$42.75, \$43 and up to \$44 for one or two small lots, but it would be difficult to find a market for any quantity, unless at inside rates, and the heaviest sales were at the lowest figures. The immediate future does not seem to be very promising, but higher prices are predicted before many weeks elapse. Consumers are said to be waiting for a decline, and as they will all want to buy at the same time, prices will probably soon recover.

Scrap Iron.—Is still in steady demand and prices are unchanged, viz.: Wrought, \$40 @ \$42.50; Cast, \$30 @ \$32.

Nails.—Are held firm at \$5.25, and with light supplies a further advance is hinted at.

PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, 1
PITTSBURGH, Pa., Feb. 17, 1880.

The most notable event of the week was the freshets in our rivers, the result of which has been another large "run" of Coal to the down-river markets, regarded as unfortunate by the Coal men, although they always take advantage of these freshets, and send whatever Coal they have ready, as it cannot be marketed here, and it is considered a good rule to keep it where it can be converted into cash whenever it can be done to the best advantage. Owing to the repeated strikes recently on the part of the diggers, both Coal and Coke are in scant supply here, and some of our iron mills have been obliged to curtail operations in consequence. Coal is higher here, relatively, than at Cincinnati, Louisville and other points that draw their supplies from Pittsburgh, and it is hard to obtain. The strike by the miners in the Connellsville Coke Region at one time threatened to assume dangerous proportions, but happily the crisis is believed to be past.

Pig Iron.—Business has been rather more active the past week, and a firmer and more hopeful feeling obtains on the part of producers. Some of them predict that another boom is near at hand, but the most of the trade would prefer to have the market settle down at about current rates, believing that a further boom will, in the long run, be detrimental to the best interests of all concerned. That the market is easier there is no denying, and some of the sales within the past two weeks show a decline of from \$1 to \$2 7/8 ton, but holders generally are refusing to make any concessions, from which it is evident that they have hopes of an early reaction, of which, as already intimated, there are favorable indications at the present time. Prices may be fairly quoted at \$40, cash, for Neutral Forge, \$43 @ \$45 for all-red Red Short, and \$42 @ \$45 for Foundry. The only sale of Bessemer reported was 200 tons White, at \$43, cash. A sale of No. 1 is reported as having been made at Cleveland at \$50.

Manufactured Iron.—The market is less active and easier, in sympathy with Pig Iron, but the mills are still busy in working up old orders. That the Spring trade will be heavy is very generally expected, but the demand for some time past has been curtailed by the very bad condition of the country roads in many sections. Manufacturers complain that Raw Iron is higher relatively than the product, and the enhanced cost of coal, coke and labor has increased the cost of production considerably of late, while the card remains unchanged at 4¢ base, and rates are not as rigidly adhered to as they were some time ago.

Nails.—The advance last week by the Western Nail Association was not as great as it was expected to be, only 25¢ 7/8 keg, which may be attributed, in part, to the easing up in iron. Had the meeting been called two weeks sooner, the price would no doubt have been advanced 50¢ @ 75¢ 7/8 keg. The feeling at one time prevailed that they would be put to the even \$6, and there was considerable inquiry on speculation. There would have been no trouble in placing several thousand kegs at the then full card. Some of the Wheeling manufacturers, who are probably sold considerably ahead, opposed putting the price above a \$5 25 base; and possibly it is just as well, the way things look at the present writing, that prices were not put up any higher, although there is every indication of a big trade during the next three months.

Railway Spikes.—Price remains unchanged at 4 1/2¢, 30 days. Manufacturers report that they are very busy; some of them are sold several months ahead.

Muck Bar.—Notwithstanding the easing up of the Pig Iron market, prices of Muck Bar are still maintained, and we repeat former quotations, \$63 @ \$65, cash at mill, according to quality. The stopping of a number of puddling furnaces recently, owing to the scarcity of coal, has tended to stiffen the market for Muck Bar by increasing the demand and reducing the production. It is not likely, however, that the coal famine will last much longer, as the diggers are pretty generally resuming work again.

Wrought Iron Pipe.—There is a very fair and increasing demand, and the recent advance, equal to 15¢ @ 20¢, is fully maintained. The indications now are that there will be a very heavy demand during the spring and summer, and manufacturers are anxious to work up an assortment of stock now, before the busy season fully opens up. Discount on Gas and Steam Pipe, new list, 35¢; Boiler Tubes, 5¢ and 5 1/2¢; Oil-Well Casing, 1/2-inch, \$1, net; do. Tubing, 2-inch, 35¢, net.

Steel.—The demand has fallen off somewhat recently, but manufacturers are very busy, unable to catch up with their orders, and are almost as much worried as when there is a scarcity of business, as buyers are becoming very impatient. Prices unchanged.

Rails. There have been no sales of Steel Rails reported here for some time. Prices are still quoted at \$85 @ \$90, cash, at mill, but there have been very few sales made above \$65, the mills, not only here, but elsewhere, having sold largely when that price was reached, as it looked big at that time. Nothing doing here in Old Iron Rails—none offering except from the seaboard.

Horse and Mule Shoes.—Are still quoted at \$6 @ \$7, cash, for 100 keg-lots, with a very fair business. The old custom on the part of buyers of stocking up twice a year, February and June, is not near so closely adhered to, which may be attributed to the largely increased railway facilities.

Scrap.—The Scrap market appears to have partaken somewhat of the "lull" which has characterized Pig Iron during the past few weeks, although prices remain about as last quoted. No. 1 Wrought Scrap, \$43 @ \$45, net, Old Car Axles, \$48 @ \$50; do. Car Springs, \$42 @ \$43; Old Car Wheels, very scarce, nominal at \$44 @ \$45, gross; Machinery Metal, \$28 @ \$30; Cast Borings, \$18 @ \$20.

Window Glass.—The demand is increasing. Stocks are light and prices firm, but unchanged; discount for car-load lots 50¢ on single, and 50¢ and 10¢ on double strengths. Inquiry is chiefly for small sizes, of which there is no stock. Manufacturers have been endeavoring all winter to work up a stock, but did not succeed, and the probability now is that there will be no accumulation until next fall, as there is no doubt the demand will be fully equal to the production all the spring and summer.

Coke.—Continues scarce, owing to the strikes by the miners, and the advance noted in our report of last week is still maintained; \$3.50 @ \$4 7/8 ton, delivered free on cars at ovens. Stock is light and operators generally have a good deal of difficulty in meeting their engagements, the strike referred to having disarranged their calculations materially.

Coal.—The river is again in excellent condition for getting out Coal, and several million bushels are now en route to the down-river markets.

CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts., 1
CHATTANOOGA, Feb. 16, 1880.

There is no fall in prices. They are rather stiffer than at last quotations, although transactions are not so large in the aggregate, and no very large lots of any material changed hands during the week. The weather has been warm and pleasant up to the last days of the week, which have been cold, rainy and disagreeable. The storm of Thursday just north of here, about Nashville, was very destructive to railroad, manufacturing and other property. The week ends bright and cool.

Pig Iron.—Sales are confined to small lots for immediate consumption, but prices are rather stronger than heretofore. There is a general feeling here among dealers and producers that the boom has culminated, and that we have noted the last advance for some time. We note prices stiff and continue our last figures. We quote: Coke and Charcoal No. 1 Foundry, \$38 @ \$40; Gray Forge, \$35 @ \$37; White and Mottled, \$28 @ \$30; Car Wheel Metal, \$42.50 @ \$50.

Muck Bar, &c.—No Muck Bar or Old Rails in market. Wrought Scrap continues very scarce and is advancing. We quote at \$35 @ \$40; inferior do., \$20 @ \$25; Cast Scrap, \$25 @ \$30; inferior do., \$20 @ \$25, according to make.

Ores.—The Ore market is firm and steady. The supply is quite up to the demand. We quote: Brown Hematite, 50 @ 56¢ per ton, \$2 @ \$2.75 per ton; Red Fossil, \$2 @ \$2.25, on cars or on wharf from flat boats.

Nails.—We continue to quote at \$5.50 rates with no supply in stock, and mills doing business only on day quotations.

Manufactured Iron.—We advance Bars to \$4.25, an advance of 50¢; Railroad Spikes, \$4.50; Track Bolts, \$5.50; Trestle Bolts, \$6; Fish Plates, \$4.

Coal.—We quote run of mine \$1.75 @ \$2 and in fair supply. Lump 10¢ @ 12¢ 7/8 bushel, delivered.

Coke.—There is nothing new in the Coke trade. It continues scarce and prices are firm. We quote at \$3 for Furnace and 10¢ @ 12¢ 7/8 bushel.

Steel and Iron Rails.—Are nominal at \$65 @ \$70 for Iron and \$80 for Steel.

BOSTON.

FEBRUARY 14.—The market continues only moderately active so far as new business is concerned, and present purchases are confined to small parcels. The deliveries on account of previous orders, however, are large, and there is not the slightest anxiety on the part of makers to take orders for forward delivery, even at to-day's full prices. The furnacemen say they anticipate higher rates than lower prices. Some of the furnaces have their output contracted for as far ahead as next June, and good ores continue very scarce and high. We quote shipping port prices of American Pig Iron at \$40 for No. 1, \$39 for No. 2 and \$39 for Gray Forge. Spot lots from the Boston stores and wharves sell at \$43 for No. 1 X, and \$41 @ \$41.50 for No. 2. Scotch Pig is steady at a decline of about \$1 7/8 ton in sympathy with the easier feeling abroad.

We quote Eglington at \$34, Gartsherrie at \$35, Coltness at \$36, Cambroo at \$33, Mid-dlesborough at \$31. The receipts of foreign iron this week have been but 258 tons. Old Rails show no change, and we continue to quote \$45 7/8 ton for American. Manufactured Iron is firm and unchanged, and though new orders are not coming either to the Plate or Bar mills as freely as previous to the advance, manufacturers are very firm, and are sufficiently well supplied with business to firmly sustain present prices. We quote Bar Iron at 3 1/2¢ @ 4¢. We quote Plate Iron at \$4 1/2¢ @ \$4 3/4 for Common Tank; \$4 1/2¢ @ \$4 3/4 for C. No. 1; \$5 @ \$5 1/2 for C. H. No. 1 Shell, and 6¢ @ 6 1/2¢ for Flange. We quote Steel Boiler Plates, Bengon quality, at 8¢; Vasa do at 7 1/2¢; Tank do at 7 1/2¢. Copper is firmer, and rather more business has been done on a

cash basis of 24¢ @ 24 1/2¢. Manufacturers are unchanged, and we quote Copper Sheathing at 32¢; Braziers at 34¢; Bolts, 34¢; Buttons, 37¢; American Yellow Metal Sheathing, 17¢ @ 18¢; Yellow Metal Bolts, 20¢; and English Yellow Metal Sheathing at 14¢, in bond. Antimony continues firm at our last quotations of 22¢ @ 23¢. Lead has been quiet and unchanged since our last report, and we continue to quote large lots of Pig at 6 1/2¢ @ 6 1/4¢ and store lots at 6 1/4¢ @ 7¢. We continue to quote manufactured as follows: Lead Pipe, 7 1/2¢; Tin-Lined Pipe, 15¢; Bar Lead, 7¢; Sheet Lead, 8¢; Block-Tin Pipe, 40¢. All these are subject to the usual trade or 10% discount. Spelter is moderately active and steady at 6 1/4¢ for large lots. The store price of Spelter is 7¢ @ 7 1/2¢, and of Sheet Zinc, 8 1/2¢. Tin is dull and a trifle easier, quoting Straits at 24¢ @ 24 1/2¢. Tin Plates are firm and unchanged, quoting Bright Charcoal I. C. at \$10 @ \$11, and Bright Coke I. C. at \$9 @ \$10. Charcoal Roofing Plate at \$9.50 @ \$11.50 for I. C. 14x20, and \$8.75 @ \$9.50 for Coke ditto.—Com. Bull-tin.

ST. LOUIS.

Messrs. CARD & HOFFER, Pig Iron and Iron Ore Merchants, 417 Pine street, write as follows under date of Feb. 14: The Pig Iron market shows more signs of activity than for the past few weeks at prices as quoted last week. Holders remain firm in their views, and when the spring trade opens, say in March, or as soon as country roads get into reasonable order to move things, they will realize their expectations, as business will be more active than for years past.

HOT-BLAST CHARCOAL.

Missouri.....	\$47.00 @ 43.00
Southern.....	40.00 @ 43.00
Hanging Rock.....	43.00 @ 45.00

COKE AND COAL.

Missouri.....	None offering
Southern.....	40.00 @ 42.00
Ohio.....	35.00 @ 42.00
Mill Irons, \$40 @ \$45 and none offering.	

CAR WHEEL AND MALLEABLE, 4 TONS.	
Hanging Rock.....	55.00 @ 60.00
Southern.....	53.00 @ 57.00
Salisbury.....	65.00 @
Old Rails, \$50, cash.	

BALTIMORE.

W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, Baltimore, reports us the following under date of Feb. 16: The volume of business doing for the past week runs unusually large for the season of the year, with values firm and unchanged at annexed figures:

Ref. Bar Iron, 1 to 6 by 3/4 to 1.....	3 8-10 @ 47
" 1 to 1 1/2 by 1 1/2 to 2.....	3 8-10 @ 47
and Square.....	3 8-10 @ 47
Hoop Iron, 1 1/2 wide and upward.....	4 1/2 @ 47
Band Iron, from 1 1/2 to 4 in. wide.....	4 1/2 @ 47
Horse-shoe Iron.....	4 1/2 @ 47
Norway Nail Rods.....	5 1/2 @ 6
Black Diamond Cast Steel.....	13 @ 14
Machinery Steel.....	8 1/2 @ 9
Cast Spring Steel.....	7 1/2 @ 7 1/2
Homogeneous Steel Plate.....	8 1/2 @ 9
Common Horse Nails.....	10 @ 14
Perkins' Horse shoes, 1/2 keg of 100 lbs.....	
Mule shoes.....	

Putnam Horse Nails.....	10 @ 14
Globe Horse Nails.....	20 @ 21
Railroad Spikes.....	4 @ 4 1/2

R. C. HOFFMAN & Co., Iron and Commission Merchants, report the Pig Iron market as follows under date of Feb. 16: We have no change to report in the Iron market, with fair demand. Prices remain firm at quotations:

Baltimore Charcoal Wheel Iron.....	38.00 @ 60.00
Virginia.....	38.00 @ 60.00
Anthracite No. 1.....	42.00 @ 43.00
" No. 2.....	41.00 @ 42.00
" No. 3.....	39.00 @ 40.00
" Mottled and White.....	37.00 @ 38.00
Charcoal C. B. Blooms.....	100.00 @ 110.00
" Billets.....	100.00 @ 110.00
Refined Blooms.....	85.00 @ 90.00

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows under date of February 16: Market firm and more active than at last report.

Scotch Pig Iron.....	35.00 @ 40.00
American Scotch Pig Iron.....	42.00 @ 45.00
American No. 1.....	39.00 @ 42.00
" No. 2.....	38.00 @ 41.00
" No. 3.....	37.00 @ 39.00
" Mottled and White.....	35.00 @ 37.00
Warm-blast Charcoal.....	43.00 @ 45.00
Old-blast Charcoal.....	42.00 @ 43.00
Wrought Scrap No. 1.....	35.00 @ 38.00
Cast Scrap Machinery.....	30.00 @ 32.00
Richmond Refined Bar Iron, Standard.....	60.00 @ 62.00
Horse Shoes, Tredgair.....	5.00 @
Mule.....	6.00 @
Old Dominion Nails, (standard size).....	5.15 @ 5.25

Freights to New York, \$2.00 for 240 lbs. by rail.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., Feb. 2, 1880.

THE IRON MARKET

of the past week has been much quieter in many respects than for some time past, owing to a variety of causes, some of which lie on the surface, while others are not nearly so readily discerned. Foremost in the list of the reasons which have led to this almost phenomenal quietude may be placed the complications which have arisen from the diverse operations of the speculators at Glasgow, who, while holding on by their teeth for additional rises, are confronted by the spectacle of smaller shipments to the United States, regularly growing stocks, increased production and rather formidable preparations for enlarging the output throughout Scotland and the greater part of the North of England and elsewhere. In the face of all the hopes and desires of those who some time ago bought for a rise, prices of warrants have undergone a sharp reaction, and all makers' brands have gone back to the extent of 2/6 @ 5/7 ton. A similar state of things has come about in Cleveland, where both vendors and consumers very closely follow the Glasgow lead. Under these circumstances and conditions, the weak holders of warrants and of the iron itself have become frightened and are unloading on the best terms obtainable, in order to get rid of their liabilities and responsibilities. This naturally operates to the marked advantage of producers, and will continue to do so until the feeble ones shall have been weeded out. Thereafter, we shall probably witness a new departure, with possible additional increments in prices. That eventuality will not, however, come to pass just yet, finished iron having also been affected by the touch of the speculators with effects approximating rather closely to those just described. I therefore suppose we may not reasonably look forward to a period of some quietude—say for about another month or six weeks, by the expiry of which the first quarter will have become well advanced, stocktaking completed, and the new year's business established on a firmer basis. I have little or no fear of any permanent relapse of moment, despite the little cloud that at the present time exists in our sky. I am disposed to look upon the current slowness as being a perfectly natural outcome of the abnormal excitement which characterized the closing weeks of 1879 and the primary portion of 1880. So severe a buying fever could not fail to be followed by a more or less serious relapse, so that now it has come I fail to see why those whose jubilation has lately known no bounds, should now have allowed their previously excessive zeal to have suddenly run down to zero. For my own part I would prefer to found my observations upon the business actually in progress at the works rather than upon the operations in the open market. The latter at periods such as these are often apt to be exaggerated, and to convey wrong impressions either in one direction or the other. I believe I am correct in stating that at the great majority of the furnaces, mills and forges there is a very good amount of work in course of execution, and the

order books are for the most part sufficiently well filled to insure work for the plant and men for several months ahead. I am, therefore, not disposed to attach an undue importance to the fluctuations in pig iron, but would rather regard all such changes, either up or down, as being mercurial, and by no means in close accord with the undercurrent which in reality more faithfully represents the actual position and prospects of our iron trade. Your orders for hoops and certain other kinds of finished iron continue to come over in respectable numbers and bulk; the home call for sheets, tube strips, &c., is well maintained on account of the tin plate and general hardware manufacturers; the colonial demand for galvanized iron and fencing wire is clearly growing; the wire manufacturers are gorged with orders, and report that their once very formidable and successful German competitors are completely worsted for the time being; the makers of ship-plates are all exceedingly busy, and for months ahead will have plenty of work on orders now on the books. The hematite producers are largely sold ahead, and are so assured of coming prosperity that they have run up prices to £7 per ton. The rail mills are all actively engaged, as detailed in a recent letter. The engineers are becoming busier and require greater quantities of boiler plates, &c. Tin-plates are selling more freely than ever, and at constantly augmenting figures, the makers having orders covering the total production up to midsummer or even up to September next; and most of the hardware industries are gradually becoming brisker. The severe weather is at present stopping building operations, but so soon as the winter shall have passed, immense contracts will be proceeded with. In London alone, to my certain knowledge, millions of pounds worth of buildings, including a palatial range along the Thames Embankment for the new mint, opera house, central schools, hotels, &c., are signed and awaiting execution. In many of the large provincial towns building has been checked for several years, and with the general revival of trade is certain to become lively in the spring. Taking all these things into consideration, I am of opinion that the balance of evidence rules in favor of continued improvement instead of the contrary.

SCOTCH PIG IRON

has been irregular, but wholly weaker, since the date of my last communication, and at the present time both warrants and makers' brands are several shillings lower in price. Stocks continue to grow larger, there being now 435,403 tons in Connal's stores and probably nearly, or quite, 400,000 tons in makers' own yards. The production, too, is being constantly enlarged, the number of Scotch furnaces blowing being 108, against 87 this date last year, equal to the production of over 20,000 tons weekly. Shipments show up rather badly just now, although there has been a total increase since the incoming of 1880 of 11,855 tons, while, on the other hand, the increase in the shipments of Cleveland pig from Middlesboro' into Scotland has been 9982 tons. John E. Swan & Bros.' circular quotes ballast pig iron 55/7 ton alongside ship.

Writing from Glasgow, on Jan. 30, James Watson & Co. said: "Since the date of our last report the Scotch iron market has remained quiet at a lower range of prices, with less business doing in shipping brands, the prices of which have been generally reduced. On Monday the market opened depressed with business from 68/9 to 67/9, cash, recovering to 68/9 1/2 ton at the close. On Tuesday the opening figure was 69/1, improving 69/4 1/2; afterward the tone was flat, with business done down to 67/6, cash. On Wednesday the market opened flat at 67/6, cash, afterward advancing to 68/3 1/2 ton, while yesterday business was transacted from 68/6 to 69/3 1/2 ton, closing at 68/9 1/2 ton. To-day the market has been irregular, with a limited business done between 68/6 and 68/6, cash, closing sellers at the latter figure and buyers at 67/10 1/2 ton. The shipments last week were 7566 tons, as compared with 6331 tons for the corresponding week of 1879." We quote:

	No. 1.	No. 2.
G. M. B., at Glasgow.....	72/6	70/6
Gartsherrie.....	81/	70/6
Coltness.....	84/	72/
Summerlee.....	84/	72/
Langloan.....	81/	70/
Carnbroe.....	80/	69/
Caldar, at Port Dundas.....	81/	69/
Glenarnock, at Ardrossan.....	76/6	67/6
Equilibrium.....	76/6	67/6
Dalmellington.....	81/	71/6
Shotts at Leith.....	81/	71/6

The malleable and general manufactured iron trade of Scotland is well engaged, and there is much activity in all the ship-building yards.

CLEVELAND PIG IRON is somewhat quieter, in sympathy with Scotch prices, at about the following rates for G. M. B., net cash, in Tees:

No. 1 Foundry.....	67/6	No. 4 Forge.....	67/6
" 2.....	64/6	" Mottled.....	67/6
" 3.....	62/6	" White.....	62/6
" 4.....	62/6	" Knowledge.....	65/

HEMATITE PIGS

are very strong in all directions, and appear likely to remain so, although some little tremor has arisen among those interested by reason of the statement that your merchants or consumers are ordering ordinary Staffordshire or Shropshire cold-blast pig in place of the hematites. I take the following figures from a circular which has come before me: Hematite No. 1, Cleator, 13/6; No. 2, 13/6; No. 3, 13/1 in West Cumberland district. Hematite No. 1, Lonsdale, 13/5; No. 2, 13/6; No. 3, 13/6 f. o. b. at works, f. o. b. Whitehaven 2/ more. Hematite No. 1, Lowther, 13/5; No. 2, 13/6; No. 3, 13/6 f. o. b. at works or f. o. b. Workington. Hematite No. 1, Moss Bay, 13/5; No. 2, 13/6; No. 3, 13/6 f. o. b. at works or f. o. b. Workington. Hematite No. 1, Harrington, 13/5; No. 2, 13/6; No. 3, 13/6 f. o. b. at works, f. o. b. Workington. Hematite No. 1, Solway, 13/5; No. 2, 13/6; No. 3, 13/6 f. o. b. at works, f. o. b. Maryport. Hematite No. 1, Maryport, 13/6; No. 2, 13/1; No. 3, 13/6 f. o. b. at works, or f. o. b. Maryport. Hematite No. 1, Askam, 12/9; No. 2, 12/7; No. 3, 12/5 f. o. b. at works, f. o. b. Barrow 1/ more. Spiegeleisen is dear and scarce, so much so indeed that the long discarded German brands are again being quoted in this country.

DEPHOSPHORIZATION.

although not much talked of or written about now that the many features of the trade revival occupy so much of the space of the daily and weekly journals of this country, is notwithstanding that circumstance a live invention, and I believe I am perfectly accurate in stating that its inventors and promoters have not the most remote intention of allowing it to lie dormant. On the contrary, measures are in active progress on the Continent of Europe, especially in Rhineland Prussia and France, for developing its application to existing plant, as well as for adapting it to entirely new works. Already there are three or four converters at work on the Thomas-Gilchrist-Snelus principle, and two new pits are being erected at the Angleur Works. In this country Bolckow-Vaughan's are the responsible pioneers of the movement, and (as I have previously informed your readers) their extra machinery and plant, specially constructed for the purpose by Davy Bros., of Sheffield, will probably be fixed and in operation in about a couple of months henceforward. Mr. Winsor Richards, the able manager of the Bolckow-Vaughan concern, is understood not to entertain the slightest doubt as to the absolute and unmistakable success of the process, and is prepared to devote much of the energies and capital of his wealthy and powerful company to push the thing forward to its legitimate issues. That once done, many other concerns, now awaiting the outcome of Mr. Richards' work, will set about the reform, and will make great efforts to free themselves from the enormous charges and indifferent supplies of those engaged in the hematite trade of this country. A short time ago the sudden and remarkable spurt in the Bessemer branches cast quite a deep shadow over the immediate future of the Thomas-Gilchrist invention, and as I took occasion to remark at the time, made it appear likely that so long as there was activity the means of effecting economic production would be neglected. Other conditions have since developed themselves, and these render it extremely likely that the abnormal d.c.m.n.'s of the West Coast hematite smelters, may bring about exactly the opposite result. At this juncture, hematite pigs of Cumberland make are quoted at £6 10/ @ £7 per ton at the works, or about 10/ more in Sheffield or 5/ more by water in South Wales. With the crude materials at these figures, those of the rail makers who have obtained orders for the finished articles at £7 @ £8, 10/ per ton are more than puzzled how to "pull the thing through" with a result and profit. They certainly cannot "work the oracle," if they are compelled to use up hematite pigs; but if by means of dephosphorization they can utilize any of the common pig irons, such as selected lots of Cleveland at about 60/, Lincolnshire at 55/, or Northamptonshire at similar figures, the problem may not be found so exceedingly difficult of solution. In this way, and for these reasons, I am inclined to regard the more extensive adoption of dephosphorization as a matter nearer at hand than was thought possible a few weeks ago. In the meantime, Mr. Smith, of Barrow; Mr. Holland, of Brown, Bayley & Dixon; Mr. Hampton, of Steel Tozer & Hampton; Mr. Snelus, of Workington, and Mr. Clark, of Dowlais, are each and all working out a variety of schemes on their own respective lines. Some are making the rails ditto, without the metal once becoming cold from the blast furnaces; others are doing something in the saving of scrap ends by practicing exactitude in ingot pouring and by rolling long lengths; one, at least, is using petroleum for assisting the heating of the converters and spiegel charges, and most of them are alive to all the newest machinery. I have not mentioned Mr. Alexander Wilson, of Wilsons & Cammell, or Mr. George Wilson, of Charles Cammell & Co., in the foregoing category, because I am under the impression that I have recently alluded to some of their economic devices. As a matter cognate in some degree to the question of dephosphorization, I may call attention to the singular resuscitation of the trade in imported iron ores within the past month or two. Prior to the now past period of depression and universal losses, the most formidable preparations had been spoken of in connection with the mines and ore deposits of that portion of Northern Spain of which Bilbao and Santander are the chief points. I do not know that all that was said and written was fully authentic and reliable, but I do happen to know that a vast amount of British capital was sunk in the locality named, in opening up mines, providing railroads, wharves and general shipping facilities. Hardly had these preparations been matured when the Carlist revolution broke out and some of the mines were stopped, owing to the impossibility of procuring sufficient labor, while others were actually scenes of fighting. When that troublesome business had been allayed, there came the paralysis of trade in England and elsewhere, and the demand no longer existed. From that time until the autumn, or thereabouts, of last year Spanish ore was not wanted, and those who had invested so largely were confronted with losses on all sides. With the revival of our metallurgical industries the mineral interests have also begun to look up, and already the vicinity of the Bilbao deposits shows numerous signs of revived vitality and bustle. It is recorded that not more than three weeks ago these Spanish ores, sold with difficulty at 7.50 pesetas (each peseta a fraction over 9d.), or about \$1.50 per ton, whereas at the present time enormous quantities are being purchased at 14.50 pesetas, or nearly \$3.50 per ton, and are being brought over by the long idle fleets of vessels devoted to the traffic. Bolckow, Vaughan & Co. alone are said to have contracted for the delivery of 150,000 tons "in one line." These raw materials will be smelted by the concern in some of its 24 or so blast furnaces. Assuming that the cost of the ore f. o. b. and Bilbao averages 12/ per ton, and freight and other charges to Middlesboro' another 7/ or 8/ it is evident that it will pay much better to pursue this course—disposing of a portion of the product of the furnaces in the open market—than to risk the chances and caprices of vendors, or of the fluctuating state of the rail market. With coal, iron, lime-

stone, coke, &c., all in "a ring fence," the Easton Works are probably about as well "in it" for success as any similar establishment the world over. Should your purchases from Spain become much heavier, our Bessemer men will be compelled to again have recourse to Elba, Algiers, or the Grecian Archipelago for their supplies of pure ores. In this country our red hematites are solely procured from the West Coast, i. e., part of North Lancashire and Cumberland; the brown hematites of the Forest of Dean and Ireland, although good per se, being of less relative value.

THE ADVANCES

which have become known during the past week, although numerous, have not been of high importance. Generally speaking, the iron market is steady, but not inclined to stiffen further at present, whereas hardware and manufactured articles are gradually being brought up to the level of the increments in the materials from which they are made. In brief, the changes declared within the seven days have been these: Phosphor-bronze, £5 1/2 ton, now ranging from £119 @ £126; all quotations for wire netting, aviaries, game nets, &c., withdrawn, virtually a rise of 10%; tin-plate and japanned goods, 7 1/2 % higher; an advance of 1/4 1/2 ton in Austrian bar iron; a general rise (additional to the one recently declared) of a farthing 1/2 lb on brass and copper wire, sheets, tubes, nails, &c.; a further nominal rise of £1 on steel rails; a ten-ten extra 2/ on coke tin-plates; a further upward change of £2 on tin; a variety of "revisions" in currysoms, patent wrought hinges, chains and cables, sash pulleys and axles, box irons, escutch on pins, brass taps, stair rods, &c.; tinned and enamelled ware, 1/4 1/2 cwt.; locks, 10 % higher; lock furniture 7 1/2 % and lock screws, 10 %; and malleable iron castings for hardware purposes 1d. 1/2 lb all round. In wire, tubes, tube strips and certain other goods other rises of 20 to 25 % are not at all improbable. There is, however, a very strong feeling prevalent among those concerned that it will be better, for many reasons, to keep down quotations as much and as long as possible. One chief argument in this direction is the existence of an improving demand from the United States, which would probably be killed by any marked advances in our selling rates. As things are now, I am assured that nine-tenths of our hardware manufacturers are fully 10 to 20 % cheaper than the best terms your producers can put forward.

AT BIRMINGHAM AND SHEFFIELD

the current state of affairs scarcely appears to demand any especial notice. In the majority of the many industries carried on in the two great hardware centers there is a very considerable amount of work in course of execution, and with no further heavy increments in point of prices, there is likely to be a steady turnover for some time ahead. For cutlery, steel, files, chains, locks, currysoms, &c., the United States demand is increasing, and the colonial wants are being diverted back to their old English channels by reason of your higher charges and overabundance of home occupation. From the colonies there are many hopeful pieces of intelligence, particularly the telegraphed reports of the excellent harvest prospects in South Australia. The Cape, too, is yielding many capital indents for general hardware. For India and parts of South America consignments are again good, and there is a decided improvement in the inquiries from Eastern Europe, Italy, France and Spain.

FOREIGN.

FRANCE.

(Moniteur des Interets Matériels.)

PARIS, Feb. 1, 1880.—Metals.—After a pause, brought about by a return of cold weather, the metal trade is again becoming more active, and prices of most metal tend upward once more. Copper has gone on improving, with a good deal of buoyancy. We quote per 100 kilos. Chili Bars here 187.50 @ 190; Ingots and Slabs, 187.50; Best Selected, 200.50, and pure Corocoro ore, 185. Manganese is rising still. They quote Small Refined Ingots 200 francs; Sheet Copper for boilers, 200; Sheathing, 205, and Bolts, 210; Yellow Metal Sheathing, 185. Tin.—There has been an uninterrupted upward movement at Paris. We quote Banca, 250.50; Billiton, Straits and Australian, 251.50, and English, 254. Great firms prevail at Marseilles. They quote Banca, 257; Straits, 255, and French and English, 260. Lead.—A slightly retrograde movement has been noticeable in this market. We quote at Paris and Havre the various sorts 47.50 @ 48.50. Marseilles is more quiet and a great deal weaker under the effect of sales: Refined is also declining. They quote Soft, 45 @ 45.50; Antimony, 41, and manufactures, 51. Spelter.—This metal has kept firm and steady. We quote at Paris and Havre 54.50 @ 55; and Sheet Zinc, 67 @ 68 francs the 100 kilos. The Marseilles market has remained unaltered, except as regards old Remetel, which has risen 1 franc. They quote Sheet Zinc 63 @ 65, and old Remetel, 28. Iron.—Much activity begins to develop, and there is a good deal of excitement, without any indications that prices may recede again for some time to come. Activity and firmness may indeed be kept up till the advent of the dull midsummer season. At a recent meeting of force owners here it was shown that there are plenty of orders for Merchant Iron, deliverable at Paris, at 21 @ 22 francs, and that in England even a higher parity is current. While this is the case, the iron trade is in a satisfactory position, and the blowing in of blast furnaces long dormant, and the rise in coke lends an additional stimulus to the prevailing tendency. Considering all this, the situation for the time being appears solid enough. Consumers now readily pay at Paris 22 francs for Coke Merchant Iron of prime quality; 23.50 for Flooring Iron; 15.50 for Cast-iron Pipe, and 28 francs for 1 millimeter Sheet Iron. These prices are susceptible of an immediate further advance, dealers not being anxious to go on selling at our quotations; at least they will sell none but small quantities at the rate named. At the Northern and Ardennes rolling mills stocks of Pig Iron are dwindling down fast, so many boats being kept ice-bound in the Eastern canals. This being the case, some of the mills have taken English Pig Iron at 25 francs, deliverable at 100 miles works. This English importation is not injurious to French blast furnaces now in operation, for the latter have contracted to deliver all they can turn out for the remainder of the year at satisfactory rates. In the Ardennes iron, prices still improve, and quotations are irregular. At the North the Maubeuge meeting has fixed the price of Merchant Iron at 22 francs. Coal.—The prolonged cessation has kept the Paris market in an abnormal condition. All available Coal has passed into the hands of dealers who sell in small lots to families at 7 @ 8 francs the 100 kilos. Coke has risen considerably, and sells at 31 @ 32 francs from first hands. The Northern Railroad has bought Coal at Lens and Anzin at 11 @ 11.50 francs. At the same time the Coal companies have advanced prices to 3 francs. The general opinion, however, seems to be that Coal is bound to recede again.

BELGIUM.

(Revue Universelle.)

BRUSSELS, Feb. 1, 1880.—Iron.—No further improvement has taken place in Pig and Merchant

Iron for future delivery, but it is different with anything that has to be delivered forthwith, for all producers in Belgium are loaded down with orders. Till now the demand for iron for building purposes had not manifested itself on account of the still backward season, but this branch is now also coming forward. The same may be said of machine shops, till recently not very busy, but now also getting to be sufficiently overworked with commands, with a fair prospect that the government will soon call upon them for railroad material. Merchant Iron is worth 20 @ 22 francs, with 1.50 francs between numbers; Sheet Iron, 28 @ 30; Beams, 21 @ 22; Steel, 26.50; Scotch Pig Iron, 10 @ 10.50; English ditto, 8.80 @ 9; Affinage Pig, 10 @ 10.50, and moulage, 11.50 @ 12. The State will come out with an adjudication for a large lot of tenders and freight, and will require. At Charleroi, Merchant Iron is worth 23 francs, with 1.50 francs difference between numbers. The Ancieur Steel Works have just put in operation a second Gilchrist converter, the first one having given great satisfaction. Coal.—The advance in Coal continues unabated. Good quality Coal sells at 24 @ 26 francs; mixed ditto at 15 @ 17; small ditto at 10.50 @ 11.80; best Coke 20 @ 25, and unwashed ditto, 18 @ 20. At Charleroi, all qualities of Coal are in request, and although all Coke producers are in full blast, they find it difficult to fill all the orders pouring in upon them. Navigation is still difficult, freight to Paris @ 2 francs, and to Antwerp @ 1 franc. After a while matters will, with mild weather, return to a normal state, and Coal may then settle down to a more moderate level; but at least this seems to be the prevailing impression.

GERMANY.

(Borsenhalles.)

HAMBURG, Feb. 1, 1880.—Metals.—In Upper Silesia some five blast furnaces have been, or will be, blown in till April, adding to the present production of Pig Iron in this locality some 800,000 cwt. per annum. If in other iron districts in Germany a similar increase should take place till spring, it may not prove such an easy task as most people seem to think to prevent overproduction. For the present, indeed, everybody seems to have unlimited confidence in the maintenance of the revival, and we perceive that the Oberhausen Works have fixed the price of pig iron on the parity of 20 francs. All companies making contracts with the government now decline guaranteeing work for more than five years instead of the ten years hitherto guaranteed. Copper.—The week has not been an active one, but prices have been well sustained. Berlin quotes good qualities English and Australian 74 @ 76, and Mansfield 75.50 @ 76 marks the 50 kilos. We quote Drontheim, here, 72, and Refined Ingots, 77 @ 78. Tin.—The German markets are favorably situated. At Berlin, Banca is held at 100 @ 101. We have advanced here to 108. There is much firmness in the Lead market. Berlin quotes on the spot, Tarnowitz, Harz and Saxony, 10.75 marks. We are steady here, and quote English Pig, 21.20 @ 21.40; German ditto, 19.50 @ 20, and Spanish, 21 marks the 50 kilos. There has been no giving way in the Spelter markets. Berlin quotes at 21.75. We are here 21 marks, with spot lots and futures, while Breslau remains firm at 20 marks with ordinary brands.

DORTMUND, Jan. 26, 1880.—Iron.—The demand assumes larger proportions daily, but the upward tendency of prices has been checked somewhat. All sorts of Pig Iron as well as Merchant Iron and manufactures are eagerly required; this is especially the case with Pig Iron for puddling purposes for our rolling mills, and although in the Siegerland, in our own district and in the Saar Region various blast furnaces have been blown in, the demand remains as strong as ever. At Luxembourg and Lorraine sorts of Pig Iron are most wanted, and the agreement between the blast furnaces of those regions to resort to the establishment of a common office for the sale of their output is not liked at all by the Rhinish and Westphalian rolling mills, since they cannot do without Pig Iron from those localities. Bessemer Steel Rails have again advanced 40 marks. We now quote them 240 @ 245 marks at the works, and Bar Iron 200. In the Dortmund district there were produced in 1879, altogether, 13,000,000 cwt. of Pig Iron, against 12,000,000 in 1878; 9,000,000 cwt. Merchant Iron and Steel, against 8,000,000, and 9,700,000 Cast Iron, against 9,600,000 cwt. in 1878.

AUSTRIA.

(Austrian Trade Journal.)

VIENNA, Jan. 25, 1880.—The tendency in the Vienna iron market has remained a rising one during the week. There is every indication that the Austrian Iron industry is on the eve of greater prosperity. But this prosperity may not spread alike to all our districts, nor last an indefinite time. The momentary demand in the interior, with the exception of rails, and similar rolled material, is as yet moderate, manufacturers not being very actively engaged, and the general economical condition of the country yet leaving much to be wished for. On the other hand, that at least our blast furnaces and rolling mills have good times before them after an advance already established of 25 per cent in Pig iron and 30 per cent in Rails and Bar Iron. But iron works are generally as much as ever dependent on our outlet by export, and to this they will have to turn their early attention. They will have to produce good quality above everything else, and fortunately for them Austrian Ore are of such purity that this task is an easy one for them. They will thus be able to compete favorably with other iron producing countries. Old Rails have risen 25 during the past two months, and are deliverable at Trieste they have sold for America at 6.25 florins, and at Vienna the Danubian Steamship Co. have sold 500 metric cwt. at 5.75. Large dealings have also taken place in the Northern Railroad Co. have bought 50,000 metric cwt. of the following concern: The Lincom Co. Witkowitz, the Styrian Iron Co., and Teplitz. Italy is also buying Rails among us. Machine shops have as yet no increase of orders, and the hardware retail trade remains quite dull.

EAST INDIES.

(Gillman, Wood & Co.)

SINGAPORE, Dec. 20, 1879.—Tin.—Supplies from Malacca have been very small, and in consequence thereof our market has not declined in the same proportion as the London market. Last transactions were at \$27.50 per picul, and there are still buyers at \$27.15 per picul. Freight.—There have been several free arrivals which found ready employment for London at 42 @ 45 for deadweight. For New York the Amy Turner, now in Hong Kong, has engaged the bulk of her cargo at 35 for deadweight. The Dreadnought has still room for cargo, the Commerciënval Radierus is fully engaged, but still on the berth. The Robert Porter and Benjamin Sewall have cleared. The Robert Porter took 162 piculs Tin, the Benjamin Sewall 178, and the Electra 1005, all for New York. The David Brown has been chartered for Boston on secret terms. The Mohican, which only arrived two days ago, after a very long passage from Soura, also loads on secret terms, at \$27.50 per picul. Exchange has declined to 3/10 1/2 @ 3/10 3/4 for six month's credit drafts in London. Shipments from the Straits Settlements to the United States have been during the 11 months, 100,500 piculs Tin, against 58,735 in 1878; 58,013 in 1877; 49,636 in 1876; 52,100 in 1875; 50,007 in 1874; 37,095 in 1873; 57,513 in 1872; 40,072 in 1871; and 55,073 in 1870. P. S.—Dec. 31.—Supplies here and in Penang continue small, but next month, as is usual, the Chinese New Year, supplies are expected to be large. The market is dull; there are sellers at 27.50 per picul, but no buyers. The exports this month have been unusually large, some 100 or 120 tons; we have not yet received the Penang figures. For New York the John Shepherd has taken berth at 35/ for deadweight. The C. Rod-berters has cleared with 86 piculs of Tin on board, and the Scindia with 1200 piculs for New York. The Dreadnought has still room for light cargo. The David Brown has cleared for Boston, and the Mohican is now the only vessel loaded. The Benjamin Sewall is aground on mud in the Banca Straits, but it is hoped she will be got off without damage. Exchange, 3/10 1/2.

NIC

Hors
Works
F. W. CA

PATENT DECISION.

Hardware dealers will please take notice of the decree of Judge Lowell, of the United States Circuit Court, in the case of Millers Falls Company against Quimby S. Backus, for infringement of Bit Brace Patents, which decree was in favor of the Millers Falls Company. The full text of the opinion may be found on page 11 of *The Iron Age*, of date December 18, 1879.

We have now obtained three separate decrees against three different manufacturers, and shall continue to prosecute all infringers. When the manufacturers are able to pay the damages we shall in no case trouble dealers, but when manufacturers are unable to pay we must ask the dealers to remunerate us, else responsible makers might combine with irresponsible makers to render worthless the most valuable patents. Any reasonable man can see the point, and we have before given all dealers sufficient notice.

MILLERS FALLS CO.,
74 Chambers street, New York.

TIN PLATES

We make it our special aim to import

MAKERS' BRANDS ONLY.

We invite comparison of our prices with those of other houses quoting WELL KNOWN BRANDS, and feel assured that we can from our large assortment of selected brands, bought at low prices, fill all orders promptly and satisfactorily.

All goods guaranteed as represented.

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F. HABERMAN,
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Manufacturer of the

**Empire,
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Illustrated catalogue and prices on application.

NICHOLS' SELF-ACTING ACID PUMP.

Absolute Safety!
Perfect Ease!

Time, Labor and Material saved by using the NICHOLS ACID PUMPS, to draw all kinds of acids from carboys. Every pump warranted. Send for new circular and price list. Manufactured only by

Acid Pump & Siphon Co
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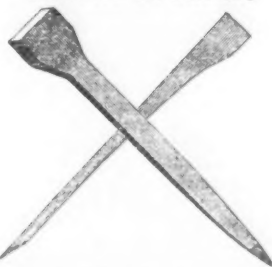
Works at Valley Falls, R. I., and Buffalo, N. Y. Office, 31 Exchange Place, Providence, R. I.
F. W. CARPENTER, President. C. H. PERKINS, Gen'l Manager R. W. COMSTOCK, Secretary

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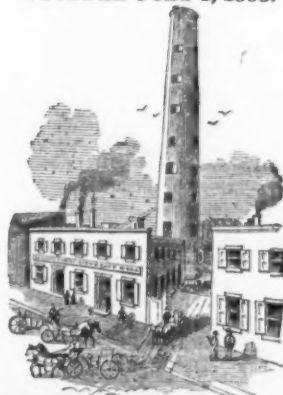


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Rivalling the English and all Others.

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PRICE AND QUALITY GUARANTEED.
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Choppers, Hand and Power
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GENUINE IMPROVED AND MECHANICS
Wide Bar Full Length. Wide Bar Full Length.

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The back thrust when in use borne by the SHANK instead of the Hand's.
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OUTSTRIPS ALL COMPETITORS.

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Every Machine Warranted to Work as Represented.



Points Claimed as being Meritorious:
Lightness combined with Strength in construction.
It runs more easily.
It will cut longer grass.
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It is the lightest machine in use, and all that is
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PRICE LIST.

Width of Cutter.	Style.	Power required.	Weight.	Price.
10 inch.	8 inch.	A Child.	30 1/2 lbs.	\$14.00
12 "	8 "	A Lad.	35 1/2 "	18.00
14 "	8 "	A Lady.	38 "	20.00
15 "	8 "	One Man Size.	38 "	22.00
18 "	8 "	"	47 "	24.00

NEW MACHINES.

For Cutting Long Grass.

15 inch, 10 1/2 inch Driving Wheels, 6 1/2 inch	
Cylinder, Man Size, 48 lbs.	\$23.00
17 inch 10 1/2 inch Driving Wheels, 6 1/2 inch	
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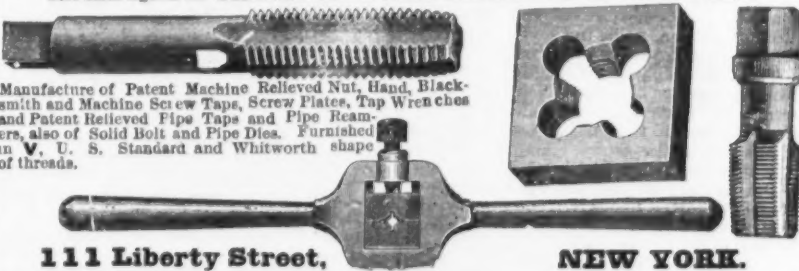
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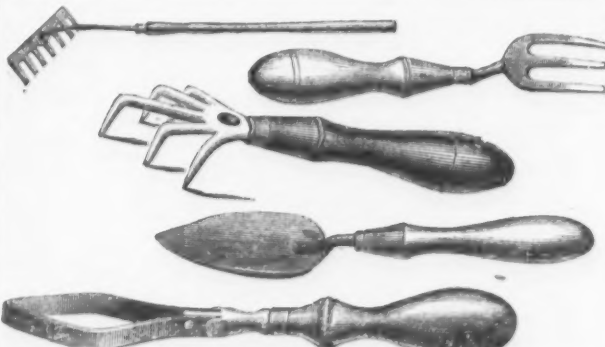
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Price, \$3.00.

For Light or Heavy Molasses, Oils,
Varnishes or other Fluids.

We warrant these Faucets to be as represented, measuring correctly and working more easily in heavy molasses than any measuring Faucet in the market. No grocer can afford to be without them, for they save time, and "time is money." They insure perfect cleanliness, requiring no tin measures or funnel to collect dirt and draw flies. They do not drip. They prevent all waste, as no molasses or other fluid can pass except when the crank is turned. They are the embodiment of simplicity, and consequently they are always in order. They work easily in the heaviest molasses. They are warranted to measure correctly, according to U. S. Standard.

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TOOLS

CHEAP, OF
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From this date a discount of 25 per cent will be made from the price list of

THE HORTON LATHE CHUCK,
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SABIN MGF. CO.,

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DOUBLE-ACTING SPRING BUTTS,
SABIN'S LEVER DOOR SPRINGS, For heavy doors,
BOSS AND CROWN SPRINGS, For light doors,

Send for Catalogue.

INDUSTRIAL ITEMS.

MASSACHUSETTS.

James F. Woodward & Son, of Wakefield, are fully occupied at their awl and shoe tool manufactory. This is one of the oldest concerns of the kind in the United States. The junior partner of the present firm is the great-grandson of Thomas Woodward, who commenced the manufacture of awls about 1812, and is said to have made the first awls manufactured in this country. The business has ever since continued in the family.

The Deane Steam Pump Company, of Holyoke, have bought out E. H. Baush's machine repair shop in order to add the room, about 50 feet long, to their establishment.

It is reported that Buchanan, Bolt & Co., manufacturers of Fourdrinier wire-cloth and dandy-rolls, at Holyoke, are to have a new building erected for them in the spring.

The Boston Lead Manufacturing Company have elected their old board of officers as follows: President, Samuel Little; treasurer, W. J. Bride; directors, William P. Hunt, Charles M. Clapp, Jacob Pfaff, Phineas B. Smith, Jr., William G. Thacher, Thomas F. Temple, Samuel Little; clerk, P. P. P. Ware.

CONNECTICUT.

The Russell & Erwin Manufacturing Company, of New Britain, have made choice of C. B. Erwin, H. E. Russell, Henry Stanley, Horace Eddy, M. J. Woodruff, H. E. Russell, Jr., and D. C. Wilcox as directors. At a subsequent meeting of the directors the old board of officers was re-elected, namely, C. B. Erwin, president; H. E. Russell, treasurer; M. J. Woodruff, assistant treasurer, and H. E. Russell, Jr., secretary. The Stanley Rule and Level Company have elected directors as follows: Henry Stanley, Augustus Stanley, F. N. Stanley, H. E. Russell, C. B. Erwin, C. L. Mead and J. A. Pickett. At a subsequent meeting of the directors, Henry Stanley was elected president, C. L. Mead, treasurer, and F. N. Stanley, secretary.

A new corporation was formed at Bridgeport, on February 9, for the manufacture of silver plated spoons, forks, &c., with a paid up capital of \$75,000. The following officers were elected: Directors, S. T. Rogers, E. L. Brittin, Theo. D. Rogers, F. W. Brittin, Wm. H. Perry; President, Theo. D. Rogers; Secretary, Samuel T. Rogers; Treasurer and Agent, E. L. Brittin. The new company has bought the tap and die property, and the tools and machinery of the Wm. Rogers Mfg. Co., late of Hartford.

The Tuttle & Whittemore Company's malleable iron works, in Union City, were partially destroyed by fire on the morning of the 15th. The loss is estimated at \$25,000 and the insurance at about \$20,000. From the fact that the works were doing an extensive business, being pushed to their utmost to supply the demands of not a few industries dependent upon them, the loss arising from the temporary suspension of business will be heavy, besides throwing out of employment about 300 hands.

PENNSYLVANIA.

The puddlers employed by the Pottstown Iron Company had their wages increased from \$4 to \$4.50 per ton commencing February 2d. The heaters were advanced to 50 cents per ton, while the increase of wages for other employees is 10 per cent.

The Philadelphia and Reading Coal and Iron Company have purchased the iron works of Waterman, Beaver & Co., at Danville, one of the largest establishments of the kind in the State. The new owners will take possession March 1st.

During the past year there have been built at the Packerton Shops, Carbon County, 255 coal cars and 70 freight cars for the Lehigh Valley Railroad Company, 50 freight cars for the Pennsylvania and New York Railroad Company, 145 mine cars for the Lehigh Valley Coal Company, and 1000 box cars for the New York, Lake Erie and Western Railroad Company, besides keeping all the cars of the company in good repair.

The Pennsylvania Furnace, Huntingdon County, will start up as soon as the Lewisburg and Tyrone Railroad is completed to the latter place.

It is now confidently asserted that the Minersville Furnace will be in full blast by the 1st of April. A large force of workmen is engaged in making the necessary repairs and improvements, and as soon as this work is completed the fire will be lighted. The furnace property is now owned by the holders of the first mortgage bonds, which amount to \$50,000, and are said to be held by 17 parties. As it has a capacity of 10,000 tons per year, under the conditions of the lease made with George W. Snyder, of Pottsville, this will prove a paying investment to the holders of the bonds. These conditions are, that when gray forge is selling at \$14 per ton, the owners shall receive 25 cents per ton for the use of the property; for each additional \$1 in the price of gray forge they shall receive an additional rental of five cents. Thus, if gray forge continues to sell at the present price, which is in the neighborhood of \$30 per ton, they will receive a rental of \$7 per ton, or nearly \$10,000 per year, which is about 20 per cent. of the amount invested in bonds.

The Carlisle Volunteer of last week says that J. C. Lehman has leased some very valuable ore grounds to Mr. Elias Fisher, of Newport, Perry County. These grounds lie along the foot of South Mountain, opposite Boiling Springs, and quite near to the ore banks now extensively worked by the Philadelphia and Reading Coal and Iron Company, and contain a great abundance of ore, the indications being rich all over them. Mr. Fisher is an old experienced iron ore miner and a man of means. It is thought that he will give employment to upward of 200 men.

It is said that the existence of iron ore in very large quantities has been discovered near Mercersburg, Franklin County. The Harrisburg Car Manufacturing Company have received another order for 1025 eight-wheel cars from the New York Central and Hudson River Railroad Co. This will give steady employment to 900 men for a period of at least three months.

PITTSBURGH AND VICINITY.

Messrs. Smith, Sutton & Co., of the La Belle Steel Works, in Allegheny, have con-

tracted with the Atlas Works for the construction of a new engine of 150 horsepower. The cylinders will be twenty-four inches in diameter, with a stroke of thirty-six inches. It will drive two sixteen-inch band wheels, which will have a face of twenty-five inches. These wheels will be counter-geared so as to run the eight and ten-inch mills.

The high water in the various rivers in this neighborhood has caused the temporary stoppage of several mills, the water flooding the wheel pits. This is a rare occurrence.

The fly-wheel connected with the large engine of Byers & Company's mill burst a few days ago, doing much damage, but fortunately killing no one. The cause of the accident was the breaking of a piece of metal in the governor, by which it was opened and a full head of steam admitted to the cylinder. Several of the employees bravely tried to stop the engine, risking their lives in the attempt; but it was impossible, and the motion of the wheel was accelerated until it flew into fragments.

The work of dredging the shore line for the incline over which the Baltimore and Ohio road proposes to transfer its cars to the Pittsburgh and Lake Erie railroad is nearing completion. The Monongahela Dredging Company have their boats at work. On account of the bad weather the work of excavating has been greatly interfered with.

Williams, Long & McDowell are making four thousand plates, on account of the Keystone Bridge Company, for the great iron bridge at Baltimore. Every department of the Keystone Mill is running to its fullest capacity.

The pressure of business at the Manchester Locomotive Works continues so great that the men are still working night and day.

Moorhead Bros. & Co.'s sheet and plate mill started last week double turn. They are producing about 15 tons per day.

The report that the Soho Furnace of Moorhead, McCleane & Co. has gone out of blast is incorrect. It has simply been banked up, awaiting the result of the strike in the coke regions.

DELAWARE.

The industrial establishments of Wilmington are at present in full operation, and most of them with orders that will insure a continuance of a brisk trade for some months to come. There is also a cheerful feeling in almost every branch of trade, and the prospect for a profitable business is better than it has been since 1872. During the past year many new buildings were erected, and the coming building season, it is said, promises to be quite active. In visiting the more prominent manufacturing establishments, it was found that they were running in almost every case to their full capacity. At Pusey & Jones Company seven iron vessels are under contract, and five of them are on foreign account. This Company's shops and shipyard cover 10 acres, and in the various shops connected with the establishment 700 men are employed on full time. The Wilmington Car Works, owned by Bowers, Dare & Co., are now running nearly up to their full capacity. They turn out 70 passenger cars per year, and about 20 freight cars per week. They are now making the iron work and trucks complete for a narrow gauge road in Brazil. A portion of the finished work was shipped last week. The firm are also constructing a number of street cars for city passenger roads in Philadelphia, and a number of cars for a steam road in Florida. The Diamond State Foundry, owned by Mr. H. F. Pickels, covers about 2 acres of ground. At this foundry, ship work, iron for cars and fine castings are executed. The same busy scene is witnessed here as in the other establishments already noticed. The carriage manufacturers, though not so crowded with work as many of the other establishments, are still doing a fair business, with a prospect for an increased demand. The capital invested in this trade in Wilmington amounts to about \$700,000, while the sales, principally to the South and near home, will reach \$1,000,000. The principal manufacturers are McLeer & Kendall, Gregg & Bowe, C. W. Horn, John Green, Coolen & Bro., Jones Guthrie, S. D. Pascall, John Reeves, Zalta & Kaiser and Frist & Allmon. These works give employment to nearly 400 men. In addition to the above there is the Diamond State Iron Company, with two rolling mills in operation, at work principally in turning out railroad track supplies. Walton, Wahm & Co., manufacturers of fertilizers, acids, &c., have just completed a large addition to their acid works. The firm, as is well known, own the extensive phosphate deposit near Charleston, S. C., and in this line of business cannot be well excelled for the amount of fertilizers sent out. J. Morton Pool & Co. are also busy in the manufacture of chilled rods and machinery of various kinds. Hilles & Jones have a large boiler works, and among their specialties is the production of metal buoys. Seidel, Hastings & Co. are running two large rolling mills in the production of plate iron for shipbuilding and other purposes. The Christiana Iron Company are just about starting a new mill for the production of plate iron. The cotton mills of Pusey Bros., M. Gambrell & Co., J. M. Pusey, Riddle Mills, Joseph Bancroft & Son, are all busy and adding to the general prosperity of the city.—*Cor. Phila. Public Ledger.*

WEST VIRGINIA.

Belmont Mill, Wheeling, recently declared a 15 per cent. dividend and added \$20,000 to its surplus fund.

OHIO.

The Steubenville Iron Company have their furnace at Stony Hollow, above Steubenville, in full blast and doing well, after encountering many drawbacks. She is now making 25 tons of iron daily.

Brown, Bonnell & Co. are the first among the iron corporations in the Mahoning Valley to introduce the electric light into their works. They have already contracted with the manufacturers of the Brush Electric Light Machine Company for a machine which will furnish them 18 lights. Their contract calls for the delivery of the machine and having it in proper condition to use on the 15th inst.

Several of the furnacemen of Iron-ton-

tend combining for the erection of a coal washing and coking apparatus, to be located, probably, near Aetna Furnace. The purpose is to make a complete test, and to contribute *pro rata* toward the expense of it. We hear that Belfont, Sarah, Aetna, Iron and Steel and Grant furnaces will go into it.

The Junction Iron Company, who took hold of the Mingo Junction furnaces, three miles below Steubenville, last spring, have had one stack in full blast for some time, and are producing from 60 to 68 tons of iron daily. The company is officered by Alexander Laughlin as president, George A. Dean as secretary and W. M. Burt as manager. The furnace in blast has a 60-foot stack, 16-foot bosh and four tuyeres. No. 1 stack is of nearly the same dimensions, and may be put in blast at an early day. Mr. James Skelding, formerly of the Lucy Furnace, Steubenville, is foundryman. The company are also operating their shaft, manufacturing a portion of the coke used. They give steady employment about the furnace and in the mines to some 120 hands.

The work of remodeling the old mill at Iron-ton, purchased by the New York and Ohio Iron and Steel Company, is rapidly going on. Extensive changes have been made in the position of the machinery, and also of the large engine. A new engine is to be put in to run the bar mill. In excavating for the new foundation for the squeezers, the workmen struck an extensive supply of mill cinder. About 22 tons were unearthed in a single day, and it is proposed to push such operations as far as practicable in the mill and yard. When that cinder found its resting place there a number of years ago, it was considered worthless, but it now finds a ready sale.

The Akron Steam Forge Company, Akron, are doing a prosperous business, giving steady employment to some 50 hands. The officers of the company are: Mr. A. L. Conger, president, and Mr. John McGregor, secretary. The area of ground owned by the corporation is 10 acres, and the works occupy a space of 265 by 60 feet. In the axle shop are four steam hammers—one 4000 pounds upright, taking steam both ways; two helves, each with hammer head weighing 2000 pounds, and one with head of 1500 pounds; five heating furnaces. The product of this company comprises car, driving and locomotive axles, shafting, 11 sizes of eye-bars for bridges, and every description of wrought shape work.

Ohio Furnace, having used up all the charcoal on hand and having 150 tons of ore remaining, is using raw coal for fuel, with fair success.

Richland Furnace is soon to go into blast. A new blast furnace is to be built at Kyle Slope, Jackson county.

The firm of Randall & Baker, stove and hollow-ware founders, of Cincinnati, have been succeeded by Randall & Stransky. The new firm, while continuing the manufacture of stoves and hollow-ware, propose to increase their business in tin-plates, sheet iron, copper, solder, and all goods used in the tin shop, stamped ware, plain and japanned ware, &c. The stove and hollow-ware department is under the direction of Mr. T. G. Randall, while Mr. Maurice Stransky has charge of the other lines of goods. The firm will manufacture a number of specialties.

ILLINOIS.

Kurtz Bros. & Buhner, Chicago, foundry and machine works, have increased their capacity one-third during the year, with a corresponding increase in the business. They employ a force of 65 workmen.

INDIANA.

The Terre Haute Car Works have closed a contract with the Cairo and Vincennes Railroad for 350 freight cars.

MISSOURI.

The corporate name of the Vulcan Iron Works, St. Louis, has been changed by unanimous vote of the shareholders to the Vulcan Steel Co. The works of the company, consisting of a two-converter Bessemer plant, a blooming mill, a rail mill, a billet mill, three blast furnaces owned and the Jupiter Furnace leased by the company, are now being put in order for the manufacture of Bessemer steel rails and billets. The converting works and mills and one of the blast furnaces will be started this week. The following is the organization of the company: President, D. K. Ferguson; vice-president and general manager, Wm. F. Shinn, formerly of the Edgar Thomson Steel Co., Limited; secretary, John C. Lewis, formerly with Erie & Western Transportation Co., Buffalo, N. Y.; operating department: General superintendent, James M. Duncan, formerly with Roane Iron Co., Chattanooga, Tenn.; mechanical engineer, John Stevenson, Jr., formerly with Mackintosh, Hemphill & Co., Limited, Pittsburgh, Pa.; superintendent Bessemer works, George Jenkins, formerly with Bethlehem Iron Co., Bethlehem, Pa.; superintendent furnaces, George Froeschner, formerly with Ashland Iron Co., Maryland; master mechanic, John McKenna, formerly with Edgar Thomson Steel Co., Limited. All communications relating to the business of the company should be addressed to Mr. Shinn.

The Vulcan Steel Works, St. Louis, blow in their No. 3 furnace on the 18th. They will get their converting works in operation this week.

ALABAMA.

The large iron and steel mill which is being erected at Birmingham, will start with twenty-four puddling furnaces and gas-heating furnaces. The management will be the same as that of the Louisville Iron and Steel Works, at Louisville, Ky., viz.: W. B. Caldwell, Jr., president; and A. J. Moxham, superintendent. Work is being pushed as rapidly as possible, and the mill is expected to be in full operation in July.

We learn that the torpedo boat Alarm, which has been fitted with the Fowler propeller at great expense, attempted a trial run some time since, but there was an imperfection somewhere in the connections between the engine and the propeller shaft, so that the latter could not revolve. This trip had been in prospect for several months, but all the proceedings were so carefully guarded the inventor himself being refused

admission on board) that little is known to outside parties of what has been done. The fact that the propeller bearings project several feet below the line of the keel, is not of itself a desirable feature.

The Unfinished Ironclads.

At a recent sitting, Senator Bayard, of Delaware, presented to Congress a memorial from a firm of shipbuilders in Wilmington, Del., asking Congress to take speedy action of some kind with reference to the double-turreted monitor Amphitrite, now occupying valuable space in the shipyard of the memorialists. Work upon this vessel was stopped in January, 1877, by order of the Secretary of the Navy, in consequence of the failure of Congress to make an appropriation for the continuance of the work.

In presenting the memorial Senator Bayard made a brief speech, saying that when in Europe last summer he had given the subject of naval shipbuilding some attention, and had personally inspected some of the modern English ironclads. When he viewed the strength, the power and the apparent invulnerability of these ships, very grave apprehensions were raised in his mind. "I don't know of anything," said he, "unless it be the torpedo defense, that is to prevent any one of many English naval vessels from steaming into any American port and laying waste the great cities." The Amphitrite, he said, is one of four vessels of the same class, and all are in a similar state of incompleteness, owing to want of money.

Mr. Bayard said that in the opinion of naval authorities these vessels would be useful for harbor defense, although they might never be serviceable as cruisers. He said he had in his possession the descriptive details of the construction of four ironclads for the Italian navy, any one of which could withstand the attack of our whole navy.

The Secretary of the Navy recently wrote a letter to the House Committee on Naval Affairs, in which he said, in regard to the four ironclads referred to by Mr. Bayard (the Amphitrite, Monadnock, Puritan and Terror):

"I desire now to make the following suggestions: All these vessels are nearly ready for launching, but the work upon them has been suspended for want of funds. They now occupy building slips in the yards of the contractors which cannot be used by them for other purposes. This is, of course, injurious to the contractors, as it deprives them of the use of these slips in the prosecution of their work. The question, therefore, whether these vessels shall be completed or shall be left in their present condition, is submitted to Congress to decide. There are no funds under the control of the department which can be properly expended upon them, and unless the money is appropriated, the department can do nothing more than see that they are properly taken care of. [Here follow detailed estimates for the completion of the four vessels, amounting to \$3,085,614.]

"The necessity of making an appropriation to cover the estimates involves an inquiry into the character of these vessels and their probable value for war purposes when completed. They are designed to be equal to any in the world of their class, and it is believed that they will be so. The work upon them thus far has been satisfactorily performed; the materials are of the best quality. The department is satisfied that when completed and added to the number of effective monitors now on hand, we shall possess the means of furnishing complete protection to all our harbors and cities. The large cost of the vessels is not so great as that of similar ones constructed for European navies. It is not deemed expedient to adopt the heavy guns and armor of the latter, and yet they will be so constructed that they may safely carry such as will enable them to resist successfully any attack that may be made upon them, and at the same time possess all necessary effectiveness in attacking an adversary. They will, if completed, add materially to the effectiveness of the navy; but if left in their present condition their value will constantly deteriorate, and in the end they will become an entire loss."

Replying to the further request of the subcommittee to be informed whether any Board of Survey had been held upon either of these vessels, the secretary said:

"I have the honor to state that two boards of survey were held upon the Puritan. The reports of those boards, containing the modifications recommended, were communicated to the Committee on Naval Affairs of the House of Representatives April 15, 1878. The report made by Naval Constructor Lenthall and Chief Engineer Isherwood, at the request of that Committee, was also transmitted to it June 15, 1878. The other vessels have not been surveyed by boards, although an examination was made of the Monadnock by the Naval Constructor of the Mare Island Navy Yard, but that examination had reference only to the claim of the contractor for damages on account of suspension of work, &c."

"Certain modifications having been made in the Monadnock, the Department contemplates making similar ones in the other vessels of her class. The cost of these modifications for each vessel will be about \$30,000. As the cost of work has increased from 50 to 100 per cent. in materials and about 25 per cent. in labor, it is not supposed that these vessels can now be finished at the price contracted for March 3, 1877; and the cost of work will be still further increased by the substitution of a combination of steel and iron in place of iron for side armor and for turrets. It is suggested that the appropriation for the hulls of these vessels be increased to a sum sufficient to complete them with all recent improvements ready for sea. The amount required for this purpose can be ascertained in a few weeks."

The idea of making a train lay down and take up its own rails as it moves along is not a new one, but an interesting realization of it is now to be witnessed in the Jardin des Tuileries, Paris. The system is that of Clement Ador. The rails on either side of the carriages consist of a series of jointed pieces of rail, with flat supporting pieces;

they inclose the system of wheels, passing down over the front and up over the end wheels, and all the wheels have two flanges to prevent any derailment. In front the chains of rail are guided by two distributing wheels, which are governed by the traction, so that on pulling obliquely, right or left, the endless way automatically follows the same direction. At the end of the train, again, are two taking-up wheels, provided with differential motion to meet the difficulty of going in curves, which involves an extension of the rail on one side and a contraction of that on the other, so that whatever the curve (to six or seven meters radius) the way is regularly put down and lifted. From the mechanical point of view one is struck with the smallness of the force required to move a train thus arranged. In the Jardin des Tuileries the train consists of three carriages, capable of containing in all thirty children, and often full. These are drawn by two goats, which work thus for seven hours. The total load is about 1000 kilograms, or rather more than a ton. To draw a like weight in three carriages on ordinary roads would require a dozen goats, four for each vehicle. (This is the number harnessed to the small carriages for children in the Champs Elysee.) The economy of carriage, then, is incontestable. The normal speed is four to six kilometers, or three to four miles, per hour. The system is, of course, not designed for passenger traffic, but for goods, and in many places, with bad roads or none, might be very serviceable.

Filtering the Mississippi Water.

The St. Louis Republican says: Plans and drawings are now nearly completed in the office of the president of the board of public improvements for the construction of a filter to be used at the water works to clear the sediment from the water raised by the pumping engines. The matter is, to a certain extent, an experiment, but it possesses an undoubted interest for all who use water from the city mains. As is well known, the original plan for the construction of the St. Louis water works contemplated the construction of extensive filter-beds, to be located on the level ground west of the settling basins, and to be used in clearing all the water delivered to the city whenever the ordinary process of settling should prove insufficient. Such an apparatus would, of course, involve great expense, and there has always been a question as to the plan on which these filter beds should be constructed. The amount of sediment carried in the waters of the Missouri and Mississippi rivers is so great that the filtering presents greater difficulties than are met in any of the European cities in which the process is applied. One of the great difficulties lies in the necessity for frequent cleaning of the filters and the trouble and cost attendant thereon. As stated above, the experiment contemplated now will only affect the supply required to run the engines at the works, but it may, nevertheless, be of importance in determining the plan on which filters for the city supply will eventually be built. The plan under consideration is an adaptation of the process of upward filtration. The filtering apparatus consists of a reservoir 25 feet square, having an iron grate near the bottom on which is a layer of coarse gravel, covered with layers of finer gravel, over which is placed 14 inches of clean sand. The water is let in below and filters upward through the gravel and sand, and is drawn off from the reservoir above for use. There is no doubt that the filtration thus designed would be effectual and would deliver the water pure and clear. The principle is in use in small filters for house use, and the main benefit as applied to the muddy water of St. Louis lies in the facility with which the apparatus can be cleaned. This is accomplished by letting the water flow downward through the sand and gravel under a moderate pressure, which is easily obtained. The sediment, which nearly all lodges in the lower strata of the filter, is quickly washed out, and the filter bed does not require to be changed often. It is expected that the projected filter, with a surface 25 feet square, will deliver sufficient water to supply the engines, and of course the result of this experiment on a small scale would afford valuable data for estimates as to the capacity, cost and construction of similar works on a large scale. It is not at all certain when even this filter will be built, as there is not any appropriation for the purpose at present. It is not likely, however, that the people of this city will always drink coffee-colored water during several months of the year, especially when it is the belief of many that it is perfectly feasible to make the water pure and clear. Of course this is not likely to be done as long as it is difficult for the city to find money to maintain the unfiltered supply; still, if the experiment is made, the results will be looked forward to with interest.

GLASS ITEMS.

The center furnace at the Buckeye Glass Works, Martin's Ferry, Ohio, has been made 10 feet higher. Fire has been put in, and glass making will begin in about two days.

The Central Glass Company, of Wheeling, W. Va., and the Rochester Tumbler Company, of Rochester, Pa., get the credit of doing a larger export trade than any other glass concerns in the country. They ship whole train loads at a time to New York for foreign customers. The latter company have sent large invoices of their goods to Japan and China within a few days. A new office, warehouse, &c., will soon be built by this firm.

A dispatch from Jeffersonville, Ind., says: Much excitement prevails here over the failure of the Ford Plate Glass Works Company. The crisis came last Friday in the form of a judgment of foreclosure in the Circuit Court, suit for \$61,000 having been brought by the trustees. In addition to this, there is \$27,350 of secured paper, supposed to be held by the Citizens' National Bank, and a floating debt of \$20,000, making a total indebtedness of \$108,350. The stockholders will be bankrupted. It is said that a new company will be organized to operate the works.

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Knapp & Co., 100 N. 3d, N. Y.	97
Knapp & Co., 100 N. 3d, N. Y.	98
Knapp & Co., 100 N. 3d, N. Y.	99
Knapp & Co., 100 N. 3d, N. Y.	100

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Rowland James & Co., 520 N. Delaware ave., Phila.	5
Schenberger & Co., 100 Arch, Philadelphia	5
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Thompson & Co., 125 Chambers, N. Y.	6
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Hillebrand & Wolf, 10 S. 8th, Philadelphia	27
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Waterbury Mfg. Co., Waterbury, Conn.	34
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Blanchard P. & Co., Worcester, Mass.	35
Cooke Wm. 5 Cortlandt, N. Y.	37
Geo. Place Machinery Agency, 121 Chambers, N. Y.	16
Hammer & Co., 100 Arch, 15th st. and Pennsylvania	37
King J. M. & Co., Waterbury, N. Y.	6
Pennock Mfg. Co., Kennett Square, Pa.	37
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y.	37
Hammer & Co., Bradford, Conn.	35
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Producers Manganese Co., 41 Cliff, N. Y.	35
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Eddy Geo. & Co., 350 Classon ave., Brooklyn, N. Y.	10
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Northrop & C., Waterbury, Conn.	34
Phosphor Bronze Smelting Co., 233 Washington	33
Quincy J. W. 58 Walnut, N. Y.	6
Read D. W. R. & Co., 3044 Walnut, Phila.	6
Schoenbeck John Mfg. Co., 528 & 530 E. 20th, N. Y.	37
Starr John, Halifax, Nova Scotia	7
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Booth Garrett & Blair, 379 Chant, Philadelphia	5
Britten J. H. Budget, 330 Walnut, Philadelphia	6
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Diets R. E. & 45 Fulton, N. Y.	28
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Pullen Bros. & Co., 329 Greenwich, N. Y.	3
Oxford Iron Co., 82 Washington, N. Y.	3
Rowland Jas. & Co., 520 N. Delaware Ave., Phila.	5
Zug & Co., Pittsburgh, Pa.	7
Nail Machinery	7
Pittsburgh Mfg. Co., Pittsburgh, Pa.	25
Nickel Platers' Supplies	25
Condit, Hanson & Van Winkle, Newark, N. J.	28
Norway Shapes, Rollers of	28
Rowland Wm. & Harvey, Frankford, Philadelphia	23
Gaulleud P. W. & 3 and 4 Wall, N. Y.	3
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Haskell W. H. & Co., Wardtucket, E. I.	25
Russell, Burdall & Fawcett, Port Chester, N. Y.	18
Stenberg J. H., Reading, Pa.	35
Oil, Plumbago	35
Boyd & Chase, 107th and Harlem River, N. Y.	10
Oil Stones	10
Chester Iron Co., 407 Walnut, Philadelphia	3
Bingham C. E. & Co., Cleveland, O.	6
Llera J., 15 Day, N. Y.	3
Read D. W. R. & Co., 3044 Walnut, Philadelphia	6
Howson & Son, Phila. and Washington, D. C.	3
Stetson Thomas D., 25 Murray, N. Y.	3
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Waterbrook Steel Pen Co., New York	9
Phosphor Bronze Smelting Co., 233 Washington	33
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Bennt Daniel F., Washington, N. J.	3
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McKee & Harlin Mfg. Co., 50 John, N. Y.	15
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McKee & Archer, Burlington, N. J.	6
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Ham, Elton & Co., 75 Chambers, N. Y.	11
Hogers Wm. & Son, 102 Chambers st., N. Y.	11
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Pocket Knives	36
Herman & Co., 101 Duane, N. Y.	3
Pots and Kettles, Tea and Coffee	3
Purvis R. C., Philadelphia	21
Power Hammers	21
Dinett, Eisenhard & Co., Philada.	36
Presses, Fruit and Vegetable	36
Mohawk & Hudson Mfg. Co., Waterford, N. Y.	8
Lyons & Williams, 167 Plymouth, Brooklyn	36
Bliss & Co., 372 Grand, N. Y.	36
Peelless Parker & Shear Co., 52 Day, N. Y.	37
The Stiles & Parker Screw Co., Middletown, Ct.	37
Lee E. S. & Co., Rochester, N. Y.	21
Pumps, Makers of	21
Brooks E. R., Hartford, Conn.	21
Douglas W. & B., Middletown, Ct.	2
Powell & Douglas, Waukegan, Ill.	24
Rumsey & Co., Seneca Falls, N. Y.	7
Union Mfg. Co., 65 Chambers, N. Y.	34
Rails, Iron and Steel, Makers of	34
McClellan & Co., 100 Arch, Philadelphia	7
Cambria Iron Co., Johnstown, Pa.	3
Cleveland Rolling Mill Co., Cleveland, Ohio	3
The Thomsen Steel Co., 52 Broadway, N. Y.	34
Rivets	34
Gilmer Wm. of Wm., Baltimore, Md.	3
Townsend W. P. & Co., Pittsburgh, Pa.	3

Brazilian Trade.

The trade of the United States with the Empire of Brazil increased slightly during the last fiscal year in quantity of goods exchanged. The importation of coffee, sugar, india-rubber and other products of the tropical empire of the South was larger than the year before. The exports were slightly larger also, so that the tonnage of shipping employed in the trade was as large as usual. The value of the goods exchanged was, however, less than the year before. The comparison was as follows:

Year.	Imports from Brazil.	Exports.
1878	\$42,972,036	\$3,686,704
1879	39,385,658	8,194,370

The cause of the decline in value was the extraordinary depression of business in Brazil, and the lingering depression in America during the first half of 1879. The year ending January 30, 1879, was one of calamity and business failures and extensions on the Southern Continent. The six months succeeding showed promise of recovery, however, and the outlook is now encouraging.

The experience of the past year has revealed many important facts in regard to trade with Brazil, which American merchants need to understand if they are to succeed in the enterprising efforts they are now making to obtain a market for their goods. The annual report of Consul-General Adamson, established at Rio de Janeiro, contains this information in a succinct form. Mr. Adamson says:

"Being a tropical country, the grains of our Northern and Western States are not grown here, and therefore improved reapers and binders, grain drills, corn shellers, &c., are not in demand. For the same reason a grist mill would not do well here. A winterless country is not a hay-producing country, and mowing machines, scythes and rakes are not much wanted.

"The hay consumed in Rio de Janeiro is brought from other countries, for as there are but few roads in Brazil, the freight of hay by sea for a voyage of 5000 miles would cost less than transportation by land for a few miles.

"The greater part of the Empire being destitute of roads, there is no demand for the Western farm wagon, and off the line of the few railways, transportation to the interior is almost entirely by horse or mule back. In the cities but few pleasure vehicles are kept by private persons. A hired coach serves for special occasions. The duty on carriages is almost prohibitory. Wheelbarrows, although gradually coming into use, are still in very little demand, owing to the almost universal practice of carrying burdens on the head. But a few days since the writer saw a sturdy negro carrying a wheelbarrow on his head through the streets of Rio de Janeiro.

"It will not pay to bring to this country American frame houses, ready for putting up, because in a great part of Brazil the destructive white ant would eat up such a house in a few months. For the same reason our cheap wooden furniture is only adapted to the Southern provinces. All houses in Brazil are roofed with porous earthen tiles—the only suitable roofing for this climate. For this reason roofing paint and patent roofing materials of various kinds cannot be sold here. Metal shingles and corrugated iron are only used for roofing very large buildings that are open at the sides, such as ship houses, &c. For ordinary houses such a roof would convert the dwelling into an oven.

"The magnificent hard woods of the Amazonian Valley, which would be so valuable to our cabinet makers if they could be obtained, are not to be had because the forests in which they grow are frequently so dense and so interlaced with vines that an enormous amount of labor would have to be expended in reaching the valuable tree, and when finally cut down it would fall in the swampy, alluvial soil, from whence no available power could extricate it. No doubt some good timber could be found on the banks of the rivers, but only the poorer kinds could be floated to the saw mill, because all the most valuable woods here are of greater density than water.

"Various projects for running steamboats on Brazilian rivers have been submitted to me, but they are, in my opinion, either impracticable or premature. Certain great companies have had concessions granted them for the navigation of the more important rivers; but, as the civilized population on the banks of said rivers is very sparse, there is but little freight other than the natural products, such as sarsaparilla, india rubber, nuts, &c., which the agents of the steamboats trade for. Passenger traffic there is virtually none on any river but the Amazon, and very little there. A great part of the interior of Brazil is as little known as the heart of Africa.

"There is really no use in people of small capital trying to make trade with Brazil, but there is here a field which may be worked with profit by those who go about it in the right way and with sufficient capital. Our great sewing-machine manufacturers long since established agencies here and placed them in charge of men who devoted themselves to that one work, and they succeeded.

"At this moment I am reminded of an enterprising dealer here who has built up a large business in American stoves. It took months—nay, years—to get them introduced, to patiently explain their working, to go to houses to show why, through failure to turn a damper, or some other neglect, the dinner was badly cooked; but industry and perseverance, in this case, promise to reward the dealer here, and eventually to create a large demand for the article to the benefit of our artisans.

"If the present business of an American manufacturer will warrant him in risking \$1000 to study this market, let him come and see for himself whether his wares are adapted to the wants of this people, or whether they can be so altered as to suit the market. If these questions find an affirmative answer, then let him establish a live man from home as his agent here, with capital to tide over the first few months of discouragement, and his chances of success will be greatly increased.

"The writer has exercised consular functions in various parts of the world, and

everywhere has had forced upon him the conviction that German merchants stand in the front rank. Their mercantile training embraces not only all the details of office work, but also a thorough knowledge of geography and of the products of every land, of mercantile law and of at least two languages besides their own. The young man who is sent abroad must at once apply himself to learn the language of the country in which he is to reside—if he has not already acquired it.

"A lack of industry and enterprise cannot be charged against the ambassadors of American trade who come to Brazil in every steamship of the fine line now plying between New York and Brazil, but unfortunately nine-tenths of them have to employ an interpreter to make their business known, and the interpreter can never speak in the manner which almost compels attention and belief, as might be the case if the American seller placed the business offered in the advantageous light which he knows so well how to do in his own tongue."

Mr. Adamson reports that the imports to Brazil in 1877-8 amounted to \$77,316,119. The exports were \$87,425,630. The revenue from exports and imports was \$32,872,009. About one-half the trade of the Empire is transacted at Rio de Janeiro. The following figures are given of principal imports to that city in 1877-8, the murels being taken at a value of 47 cents:

Articles.	From England.	From France.	From United States.
Cotton goods.....	\$6,869,534	\$1,477,641	\$107,986
Woolen goods.....	1,688,943	980,954	.....
Silk goods.....	.....	776,901	.....
Stone, earth, coal, &c.	1,845,220	191,752	44,069
Iron and steel.....	929,920	243,717	.....
Linen goods.....	631,835	.....	.....
Flour, grain, &c.....	555,066	.....	1,317,063
Hides and fells.....	591,935	714,111	.....
Machinery, tools, &c.	550,518	Not given	144,952
Paints, varnish and petroleum.....	310,251	181,043	805,228
Meats and fish.....	314,778	530,524	610,216
Liquors and wines.....	Not given	4,096,792	55,063
Paper, &c.....	Not given	230,753	15,710
Chemicals.....	Not given	224,978	22,080

The value of exports from the port of Rio Janeiro during the year ended June 30, 1878, amounted in United States coin to \$43,265,540, of which the United States took \$21,272,377; Great Britain, \$5,260,139; France, \$3,209,500; Germany, \$2,931,733; Portugal, \$1,660,417. The exports to the United States during the year ended June 30, 1879, amounted to \$30,083,709, of which the one item of coffee amounted to \$30,061,762.

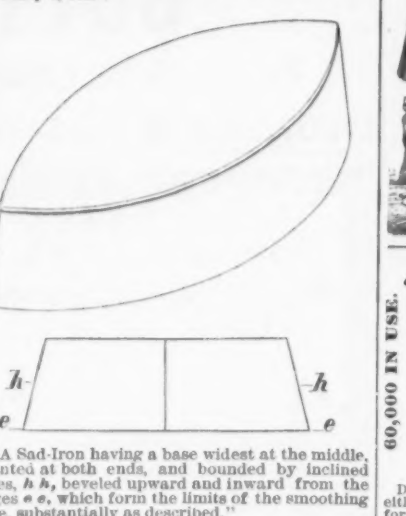
A New Process for Refining Spelter.
—We have lately been shown a sample of spelter showing unusual sharpness of crystallization and brilliancy of fracture, which is said to be as nearly chemically pure as the metal can be made. It was made from common spelter, under a process patented by Mr. A. Harnickell, 83 Maiden lane, New York. We also have a piece of sheet rolled from it cold, which exhibits great ductility and unusual toughness. We are informed that the specific gravity of the new spelter is 7.3, and that its resistance to dilute sulphuric acid is many times greater than that of any grade of this metal hitherto experimented with. For fine brass, cartridges, German silver and artistic castings, we should presume it would have unusual utility. The price ranges from 8½ to 9 cents.

"SAD-IRONS."

Caution to Manufacturers of and Dealers in Sad-Irons, and to the Hardware Trade Generally:

The patent of Mrs. Fotts, May 24, 1876, has been renewed to us January 6, 1880, and suit has been commenced against infringers of this patent, and also of Mrs. Fotts' renewed patent of October 7, 1879. Manufacturers of and dealers in Sad-Irons are hereby informed that further and proper legal proceedings will be taken against all who make and sell Sad-Irons which infringe either of the said renewed patents.

The following is the claim of Reissue No. 9020, January 6, 1880:



"A Sad-Iron having a base widest at the middle, pointed at both ends, and bounded by inclined sides, *h, h*, beveled upward and inward from the edges *e, e*, which form the limits of the smoothing face, substantially as described."

Enterprise Manufacturing Co. of Pa.
American Machine Co.

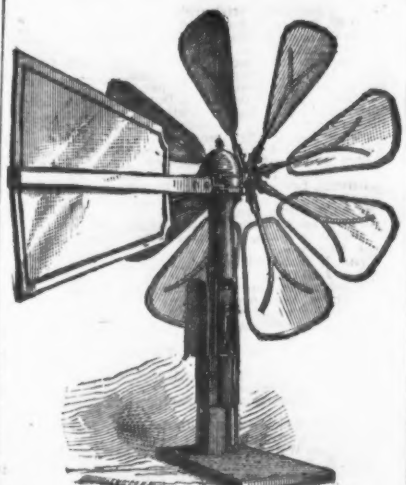
Philadelphia, February 17, 1880.



HAWES' STEAM TRAP.

We guarantee this trap to work perfectly satisfactorily. Order one; if not satisfied, return at our expense. The monthly saving in fuel is more than cost of trap. Send for circular. Price from \$5 to \$15.

Welch & Lawson,
175 Centre st.,
New York.



THE Hartford Automatic Pump.

Water Driven to any Height and Distance by Compressed Air.
Country Houses Supplied Cheaply and Certainly for Bath Rooms, Water Closets, Hot and Cold Water Faucets, &c. Plenty of Fresh Water for Stock on Farms. The best Pump for Irrigating, supplying Railroad tanks, and for Mining purposes.
For Circular and Price list address,
EZRA BLOOMER, Manufacturer,
Hartford, Conn., U. S. A.

THE STAR SALT CASTER CO.,
Office, No. 161 FRANKLIN ST., BOSTON,
Manufacturers of
Specialties in House Furnishing Hardware.
PATENT EXTENSION DOOR KNOBS



PAT. "SCREW WINDOW BALANCES."
Retail Price, \$1 per window (four balances).
Liberal Discount to the Trade.
Retain Medium and Light Windows. Dash at any point of opening, with large surplus holding power in reserve, available if required by drawing the adjusting screws. An acquaintance with the genuine merits of these goods, and their simple requirements in use will insure to them the favor of the user and applier.
A Mechanism always wanted, and as easily applied to windows as the common sash pulley, rendering the use of boxed frames, cords, pulleys, and the perplexing task of hanging each window.
Sashes are locked with a meeting rail lock, as with weights.
Sample set, 4 Balances, sent postage free upon receipt of \$1.
For sale by the Hardware Trade. Send orders, &c., to
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Tree Pruner,
Made of best steel in any desired lengths. Combines slotted hook and compound lever principles not seen in any other. Having no competition for public favor it has received the highest awards in this and foreign countries as being the best.
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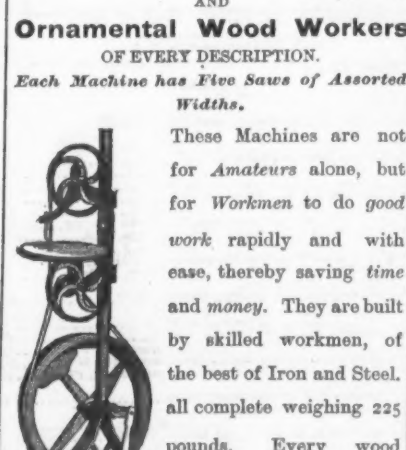


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Each Machine has Five Saws of Assorted Widths.



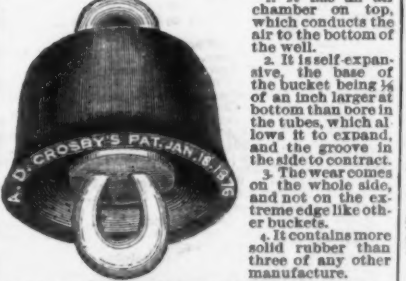
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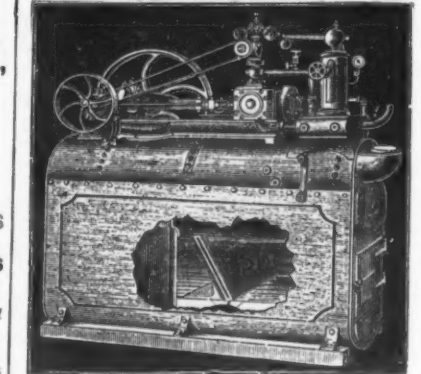
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[illegible]

Punches.	
Flat or Drive	per doz \$2.00; 2.25; 2.50; 40¢
Bemis & Call Co's Cast Steel Drive	per doz \$2.00
Springfield Socket	per doz \$2.00
Spring	per doz \$2.00
Leach's Patent	per doz \$2.00
Bemis & Call Co's Spring and Check	per doz \$2.00
Solid Tinner's	per doz \$2.00
Rails.	
Building Door Wrought Brass	per doz \$2.00
Iron, Painted, 1/2 foot 90, 100, 110	per doz \$2.00
Barn Door, 1/2, 3/4 and 1 inch	per doz \$2.00
for N. E. Hangers	per doz \$2.00
Ropes.	
Cast Steel	per doz \$2.00
Malleable	per doz \$2.00
Razor Straps.	
Genuine Emerson	per doz \$2.00
Badger's Emerson	per doz \$2.00
Badger's (not Emerson)	per doz \$2.00
Evans	per doz \$2.00
Imitation Emerson	per doz \$2.00
Chapman	per doz \$2.00
Seamless	per doz \$2.00
Torrey	per doz \$2.00
Rivets.	
Iron and Tinned	per doz \$2.00
Copper Rivets and Burs	per doz \$2.00
Tinned Iron Rivets and Burs	per doz \$2.00
Rivet Sets.	
Steel	per doz \$2.00
Rods.	
American Patent	per doz \$2.00
Hollers.	
Sarn Door, Sargent's list	per doz \$2.00
Acme (Anti-Friction)	per doz \$2.00
Hops.	
Manufacturers' Net List, Dec. 1879	per doz \$2.00
Manila	per doz \$2.00
Tar'd Rope	per doz \$2.00
Hay Rope	per doz \$2.00
Steel	per doz \$2.00
Har Rope	per doz \$2.00
Rails.	
Chapman	per doz \$2.00
Standard	per doz \$2.00
Stanley	per doz \$2.00
Stephens	per doz \$2.00
Saw Irons.	
From 1 to 10 lbs	per doz \$2.00
Gleason's Shield and Tool	per doz \$2.00
Enterprise Patent Cold Hand	per doz \$2.00
Mrs. Pott's Pat. Cold Hand, "Crown"	per doz \$2.00
Combined Fluter and Saw Iron	per doz \$2.00
Saw Paper.	
Bader & Addison's Flint, 10 to 15, 1/2, 3/4, 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	per doz \$2.00
Saw Cord.	
Common	per doz \$2.00
Patent	per doz \$2.00
Silver Lake Russia Flax	per doz \$2.00
White Cotton	per doz \$2.00
Black Cotton	per doz \$2.00
Raw Hide	per doz \$2.00
Steel Ribbon	per doz \$2.00
Saw Locks.	
Clark's No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	per doz \$2.00
Saw Weights.	
Solid Eyes, in 50 lb lots	per doz \$2.00
Massage Stuffers or Filters.	
Miles	per doz \$2.00
Perry	per doz \$2.00
Enterprise Mfg. Co.	per doz \$2.00
Saws.	
Diston's Circular	per doz \$2.00
Mill	per doz \$2.00
Cross Cut	per doz \$2.00
Hand, Panel, Chisel	per doz \$2.00
Boynton's Lightning, Cross Cut, new list	per doz \$2.00
One-Man, all lengths	per doz \$2.00
Billet, 10 to 15, 1/2, 3/4, 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	per doz \$2.00
Lightning Buck Saw, 1/2, 3/4, 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	per doz \$2.00
Lightning Hand, Panel and Hip	per doz \$2.00
Wheeler & Cushman Mfg. Co's Hand	per doz \$2.00
W. M. & C. Mfg. Co. Cross-Cut, except Monarch	per doz \$2.00
Lavington's Butcher and Kitchen	per doz \$2.00
Pruned Wood	per doz \$2.00
For doz \$1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 2.75, 3.00, 3.25, 3.50, 3.75, 4.00, 4.25, 4.50, 4.75, 5.00, 5.25, 5.50, 5.75, 6.00, 6.25, 6.50, 6.75, 7.00, 7.25, 7.50, 7.75, 8.00, 8.25, 8.50, 8.75, 9.00, 9.25, 9.50, 9.75, 10.00	per doz \$2.00
Saw Frames.	
White, Vermont	per doz \$2.00
Red, Polished and Varished	per doz \$2.00
Saw Rods	per doz \$2.00
Saw Sets.	
Boynton's Patent X Cut, per doz \$12.00; Hand Saw, per doz \$12.00	per doz \$2.00
Stimpman's Genuine	per doz \$2.00
Common Lever	per doz \$2.00
Leach's	per doz \$2.00
Nash's	per doz \$2.00
Hammer, Hotchkiss	per doz \$2.00
Bemis & Call Co's New Pat.	per doz \$2.00
Bemis & Call Co's Lever and Spring Hammer	per doz \$2.00
Plate	per doz \$2.00
Alison's Genuine	per doz \$2.00
Imitation	per doz \$2.00
Hart's Patent Lever	per doz \$2.00
Blanton's	per doz \$2.00
Scales.	
Pat. Counter, No. 171	per doz \$2.00
For doz \$1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 2.75, 3.00, 3.25, 3.50, 3.75, 4.00, 4.25, 4.50, 4.75, 5.00, 5.25, 5.50, 5.75, 6.00, 6.25, 6.50, 6.75, 7.00, 7.25, 7.50, 7.75, 8.00, 8.25, 8.50, 8.75, 9.00, 9.25, 9.50, 9.75, 10.00	per doz \$2.00
Scissors.	
Adjustable Box Scraper (S. R. & L. Co.)	per doz \$2.00
Box, 1 Handle	per doz \$2.00
Hand	per doz \$2.00
Defiance Box and Ship	per doz \$2.00
Foot	per doz \$2.00
Family Universal	per doz \$2.00
Favorite	per doz \$2.00
Turnbull's	per doz \$2.00
Scale Beams, Chatillon's list	per doz \$2.00
Sargent's list	per doz \$2.00
Screw Drivers.	
Douglas Mfg. Co.	per doz \$2.00
Diston's	per doz \$2.00
Diston's Patent Excelsior	per doz \$2.00
Buck Bros	per doz \$2.00
Stanley Rule & Level Co.	per doz \$2.00
Black Hand	per doz \$2.00
Sargent & Co's	per doz \$2.00
Screws.	
Flat Hd Iron	per doz \$2.00
Round Head Iron	per doz \$2.00
Flat Head Brass	per doz \$2.00
Round Head Brass	per doz \$2.00
brass and Silver Capped	per doz \$2.00
Japanned, 1/2 of Plain Screws	per doz \$2.00
Lar or Common Coach	per doz \$2.00
Coach Pat. 1/2 of Plain Screws	per doz \$2.00
Leid	per doz \$2.00
Machine, Flat Head, Iron, Am. Screw Co.	per doz \$2.00
Round Head, Iron	per doz \$2.00
Wood, Beech	per doz \$2.00
Hickory	per doz \$2.00
Hand Nail, Sargent's	per doz \$2.00
Humason, Beckley & Co's	per doz \$2.00
Am. Screw Co.	per doz \$2.00
Jack (Wilson)	per doz \$2.00
Screw Window Balances.	
R. B. Humason's, Single 1/2, 3/4, 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	per doz \$2.00
Shears and Nailers.	
Cast Iron (American)	per doz \$2.00
Pruning	per doz \$2.00
Barnard's Lamp Trimmers	per doz \$2.00
Tinner's	per doz \$2.00
Cast Steel, List, Nov. 25, 1879	per doz \$2.00
Beymour's	per doz \$2.00
Heinrich's	per doz \$2.00
Tailors' Shears	per doz \$2.00
Shovels.	
Sliding Door, M. W. & Co. list	per doz \$2.00
R. & E. list	per doz \$2.00
Patent Boiler	per doz \$2.00
Hartley's	per doz \$2.00
Russell's Anti-Friction	per doz \$2.00
Moore's Anti-Friction	per doz \$2.00
Moore's Anti-Friction (Hanging)	per doz \$2.00
Philadelphia Hanging	per doz \$2.00
Shovels and Spades.	
Amos, New List, Jan. 25, 1880	per doz \$2.00
Hussey Bins & Co. Patent	per doz \$2.00
Old Colony (changes in list Oct. 15, 1879)	per doz \$2.00
Remington's (Lewman's Patent)	per doz \$2.00
Dunning's Shovels and Spades	per doz \$2.00
Rowland's	per doz \$2.00

Shovels and Tongs.	
Iron and Brass Head, R. & E. list	per doz \$2.00
Polished Steel	per doz \$2.00
now list, dis 30¢, 40¢, 50¢	per doz \$2.00
Stakes.	
Square Frames	per doz \$2.00
Less than a case	per doz \$2.00
Spoke Shaves.	
Distance Metallic	per doz \$2.00
Wood	per doz \$2.00
Bailor's (Stanley R. & Co.) new list	per doz \$2.00
Douglas	per doz \$2.00
Spoke Trimmers.	
Bonney's	per doz \$2.00
Stearns	per doz \$2.00
Yves	per doz \$2.00
Spoons.	
Pat. Thread Basting	per doz \$2.00
Riveted Table and Tea	per doz \$2.00
Solid Table and Tea	per doz \$2.00
Britannia	per doz \$2.00
Derby Silver	per doz \$2.00
L. Boardman's Sons, A1	per doz \$2.00
W. Rogers & Son, A. A.	per doz \$2.00
Reed & Barton	per doz \$2.00
Hall & Elton	per doz \$2.00
Holmes, Booth & Hayden	per doz \$2.00
German Silver	per doz \$2.00
Cast Steel, Sil. Plated	per doz \$2.00
Tin (P. S. & W.)	per doz \$2.00
Tables	per doz \$2.00
Tin Cowles Hdw. Co.	per doz \$2.00
case lots	per doz \$2.00
Stocks and Dies.	
"Lightning" Screw Plate	per doz \$2.00
Stones.	
Hindston Stone	per doz \$2.00
Silpe	per doz \$2.00
Sand Stone	per doz \$2.00
Washita Stone	per doz \$2.00
Silpe	per doz \$2.00
Washita Stone (Boyd & Chase)	per doz \$2.00
mo'ted (Boyd & Chase) 6, 7 & 8 in, dis 30¢	per doz \$2.00
Turkey Oil Stone (Boyd & Chase)	per doz \$2.00
Silpe	per doz \$2.00
Lake Superior (Boyd & Chase)	per doz \$2.00
Silpe	per doz \$2.00
Grindstones, Family, Loring's	per doz \$2.00
Stove Polish.	
Joseph Dixon's	per doz \$2.00
Gold Medal	per doz \$2.00
Miror	per doz \$2.00
Rising Sun	per doz \$2.00
Squares	per doz \$2.00
Steel	per doz \$2.00
Iron	per doz \$2.00
Try Squares and T. Bevels	per doz \$2.00
Star Try Squares and Bevels	per doz \$2.00
Diston's Try Squares and T. Bevels	per doz \$2.00
Winterbottom's Try and Mitre	per doz \$2.00
Tacks, Brads, &c.	
List of Oct. 1, 1879	per doz \$2.00
Tinners' Tacks	per doz \$2.00
Swedish Tacks, all kinds	per doz \$2.00
Copper Tacks and Nails	per doz \$2.00
Swedish Hungarian Nails	per doz \$2.00
American	per doz \$2.00
Clamp and Lace Tacks	per doz \$2.00
Finishing Nails	per doz \$2.00
Trunk and Clout Nails	per doz \$2.00
Common and Patent Brads	per doz \$2.00
Basket Nails	per doz \$2.00
Brush Tacks	per doz \$2.00
Leathered Carpet Tacks	per doz \$2.00
American Cut Tacks	per doz \$2.00
Cigar Box Nails	per doz \$2.00
Chair Nails	per doz \$2.00
All other Tack List goods	per doz \$2.00
Double-Pointed Tacks	per doz \$2.00
Tap Bore.	
Common and Ring	per doz \$2.00
Ives' Tap Bore	per doz \$2.00
Enterprise Mfg. Co.	per doz \$2.00
Tapes, Measuring.	
American	per doz \$2.00
Spring Tapes	per doz \$2.00
Thermometers.	
Tin Case	per doz \$2.00
Tobacco Cutters.	
Enterprise Mfg. Co. (Champion)	per doz \$2.00
Wood Bottom	per doz \$2.00
All Iron	per doz \$2.00
Nashua Lock Co's	per doz \$2.00
Toe Calks.	
Winsted	per doz \$2.00
Turners' Tools and Machines.	
Machines (P. S. & W.)	per doz \$2.00
Tools (P. S. & W.)	per doz \$2.00
Traps.	
Grate, Newhouse	per doz \$2.00
Newhouse Patent	per doz \$2.00
Blake's Patent	per doz \$2.00
Moose, Wood Choker	per doz \$2.00
Round Wire	per doz \$2.00
Cage	per doz \$2.00
Catch-em-all	per doz \$2.00
Rat "Decor"	per doz \$2.00
Trowels.	
Lothrop Brick and Plastering	per doz \$2.00
Reed's Brick and Plastering	per doz \$2.00
Diston's Brick and Plastering	per doz \$2.00
Pease's Plastering	per doz \$2.00
Rose & Hayward's	per doz \$2.00
Brades' Brick	per doz \$2.00
Worral's Brick and Plastering	per doz \$2.00
Garden	per doz \$2.00
Triers.	
Butter and Ch. se.	per doz \$2.00
Vices.	
Solid Box	per doz \$2.00
"Crown" A. H. Hildick 40 to 100 lb, 150 dis 25¢	per doz \$2.00
Peter Wright's	per doz \$2.00
Parrell, Parker's	per doz \$2.00
Wilson's	per doz \$2.00
Howard's	per doz \$2.00
Merrill's	per doz \$2.00
Sargent's	per doz \$2.00
Trenton	per doz \$2.00
Backus and Union	per doz \$2.00
Flaher & Norris	per doz \$2.00
Stevens	per doz \$2.00
Simpson's Adjustable	per doz \$2.00
"Family" List	per doz \$2.00
Saw Filers	per doz \$2.00
Lowell Hand Vice	per doz \$2.00
Richardson's Vice and Anvil	per doz \$2.00
Washer Cutters.	
Smith's Patent	per doz \$2.00
Johnson's	per doz \$2.00
Peenny's	per doz \$2.00
Appleton's	per doz \$2.00
Washers.	
See Nuts and Washers	per doz \$2.00
Well Wheels.	
Revised list	per doz \$2.00
Wire.	
Brass and Copper	per doz \$2.00
Bright and Annealed	per doz \$2.00
Coppered	per doz \$2.00
Galvanized, Nos. 10 to 18	per doz \$2.00
Tinned, Nos. 10 to 18	per doz \$2.00
Cast Steel	per doz \$2.00
Tinned Broom Wire, Nos. 10 to 18	per doz \$2.00
Annealed Fence, 3, 4, 5 and 6 in	per doz \$2.00
Grate, Nos. 10 to 18	per doz \$2.00
Galvanized Telegraph, Nos. 7 to 9	per doz \$2.00
Wire, Nos. 10 and 12	per doz \$2.00
No. 12	per doz \$2.00
Fence Staples	per doz \$2.00
Staples, Galvanized	per doz \$2.00
Stubs Steel Wire	per doz \$2.00
Japanned Barb Fence	per doz \$2.00
Steel Music Wire, Nos. 10 to 18	per doz \$2.00
Turner & Seymour Mfg. Co. Picture Wire	per doz \$2.00
Child's Picture Wire	per doz \$2.00
Clothes Line Wire, Galvanized	per doz \$2.00
Wrenches.	
American Adjustable	per doz \$2.00
Baxter's Adjustable	per doz \$2.00
Diagonal	per doz \$2.00
Coe's "Genuine"	per doz \$2.00
"Mechanics"	per doz \$2.00
Girard standard	per doz \$2.00
Girard Duplex	per doz \$2.00
Bemis & Call's Patent Combination	per doz \$2.00
Herrick's Pattern	per doz \$2.00
Briggs' Pattern	per doz \$2.00
Cylinder or Gas Pipe	per doz \$2.00
Williams' Basins	per doz \$2.00
Aiken Pocket (Bright)	per doz \$2.00
The Favorite Pocket (Bright)	per doz \$2.00
Webster's Pat. Combination	per doz \$2.00
Wringers.	
Series, No. 5, No Cog	\$5.00
No. 2 1/2, with Cog	\$7.00
No. 3	\$8.00
No. 4	\$9.00
No. 5	\$10.00
Universal, XX No. 3 1/2	\$7.00
No. 2 1/2	\$8.00
No. 3	\$9.00
No. 4	\$10.00
rown No. 2 1/2	\$7.00
No. 3	\$8.00
No. 4	\$9.00
ovley No. 2	\$7.00
ovley No. 3	\$8.00
ovley No. 4	\$9.00
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ovley No. 6	\$11.00
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ovley No. 272	\$277.00
ovley No. 273	\$278.00
ovley No. 274	\$279.00
ovley No. 275	

Steel.

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Samples furnished for trial. Quality guaranteed equal to any.

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STEEL Gautier Steel.

See Page 3.

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Special Steel

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LATHES, PLANERS, &c.

Turns out at least double work by increased speed and less waste, and cuts harder metals than any other steel. Neither hardening nor tempering required.

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Secures absolute safety from cracking.

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Manufacturers of

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The largest manufacturers in the world of

OIL STONE

Of all description.

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Berea, O., Nova Scotia, & other brands.
Newcastle, Eng.,
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Very truly,
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The Next Half-Yearly

SPECIAL ISSUE

OF

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Will Take Place on April 3, 1880,

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Particular attention will be given to the British Colonies, India, and the other great purchasing markets.

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In compliance with many requests, the proprietors will on this occasion receive Lists and Circulars, which will be firmly stitched in with and form part of the number. Each list or circular must have the words "Supplement to the Ironmonger, April 3, 1880," printed on the top of each page. Our charges for circulating 12,000 lists will be as follows:

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All copy, blocks, &c., must reach us not later than Tuesday, March 30, 1880.

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Above Race,
Twenty years' practical Experience.

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Office: No. 88 Van Dyke St.

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JOHN R. WATSON, Perth Amboy, New Jersey.
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For Rolling Mills, Blast Furnaces, Foundries,
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Proprietor of the

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Retort Works,
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(Partial straight front.)
In 12 in., 14 in., 16 in. and 17 in. Sizes.

Very Durable and Strong.

T. F. ROWLAND, Sole Manufacturer,
BROOKLYN, N. Y.

NICHOLSON FILE CO., Manufacturers of FILES AND RASPS.

ALSO

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Manufactory and Offices at Providence, R. I.

The following space will be used in illustrating our specialties, the matter being changed weekly.

INTERNATIONAL EXHIBITION. PHILADELPHIA, 1876.



The United States Centennial Com-
mission has examined the report of
the Judges, and accepted the follow-
ing reasons, and decreed an award
in conformity therewith.



PHILADELPHIA, May 4th, 1877.

REPORT ON AWARDS.

Product, *Files and Rasps.*

Name and Address of Exhibitor, *Nicholson File Company,*
Providence, Rhode Island.

The undersigned, having examined the product herein described, re-
spectfully recommends the same to the United States Centennial Commis-
sion for Award for the following reasons, viz:

Being exceedingly well cut and of excellent material.

Daniel Steinmetz, of Pha.
Signature of the Judge.

APPROVAL OF GROUP JUDGES.

J. D. Imboden, of Richmond, Va.
Chas. Staples, Jr., of Portland, Me.
G. L. Reed, of Clearfield, Pa.
J. Diefenbach, of Germany.
David McHardy, of Great Britain.

A true Copy of the record.

Francis A. Walker,
Chief of the Bureau of Awards.

Given by authority of the United States Centennial Commission.

A. T. Goshorn,
Director General.

J. R. Hawley,
President.



J. L. Campbell,
Secretary.

G. W. Bradley's Edge Tools.

Butchers' Cleavers,
Butchers' Choppers,
Axes and Hatchets,
Grub Hoes and Mattocks,
Mill Picks,
Box Chisels and Scrapers,

Ring Bush Hooks,
Ax Eye Bush Hooks,
Socket Bush Hooks,
Watt's Ship Carpenters' Tools,
Carpenters' Drawing Knives,
Coopers' and Turpentine Tools.

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The Atlantic White Lead
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MANUFACTURERS OF
White Lead (Atlantic), Red Lead,
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Manufacturers of

Clock Springs and Small Springs
of every description, from best Cast Steel,
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13 Steps, 3 set Reeds, Stool, Book,
only \$4. Piano, Stool, Cover &
Book only \$14.50. Paper free.
D. F. BRATTY, Washington, N. J.

IMPROVED PIPE-FITTERS' VISE.



STRONG,
LIGHT,
EFFICIENT,
CHEAP.

To meet the requirements of the large number of persons who have use for such an article, we invite attention to our Improved Pipe Vise. This Vise can be used either as a permanent fixture to work bench, attached to angle plate or can (unlike others) be held between the jaws of any Machinist's or Blacksmith's Vise; the movable jaw being OPEN ON SIDE permits work to be gripped at any desired point without slipping it in from end, and allows of FITTINGS BEING HELD SECURELY; the Box is made of Malleable Iron, the Screw of Wrought Iron, and the remainder of Solid Steel throughout. The Steel Gripping Jaws can be duplicated and replaced at any time when worn out. It is a very convenient tool, well adapted to the wants of Plumbers, Pump Fitters, Well-Drivers, and all who have use for a tool that is strong, light, efficient and cheap which can be readily carried about with kit of tools.

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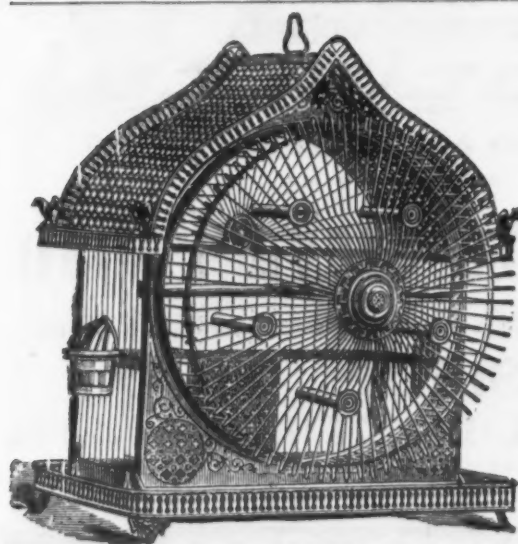
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Movable Toothed Circular Saws,
PERFORATED CROSS-CUT SAWS
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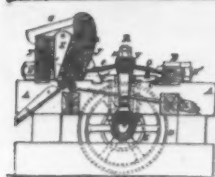


JEWETT'S
Revolving Perch
BIRD CAGE.
PATENTED.

The Revolving Perch Cage must be seen in practical operation to be able to appreciate what a charming novelty it is; or the great advantage to the bird, in the way of exercise, which all canaries require to keep them healthy, and consequently in song.

Catalogue sent to dealers only on application.
Also Manufacturers of the handsomest line of Bird Cages in the United States.

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IMPORTANT TO RAILWAY COMPANIES, CITIES AND MINE OWNERS.
Blake's Challenge Rock Breaker or Sectional Cushioned Crusher,

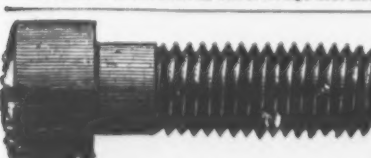
Patented Nov. 18, 1879, will be found the most economical and reliable crusher ever offered to the public for crushing railway ballast, road metal, stone for concrete, quartz, flint, emery, corundum, feldspar, barite, manganese, plaster, soapstone, &c., &c. This machine dispenses with cast iron frame and pitman of our old form. All strains are on wrought iron or steel.

Over 20 Medals, including Paris Gold and Silver Medals. Address,
BLAKE CRUSHER CO., Sole Makers, New Haven, Conn.



Beardsley Scythe Co.,
Manufacturers of
GRASS, GRAIN & BUSH SCYTHES,
Hay Knives & Corn Knives.
West Winsted, Conn.

See our advertisement in The Iron Age first issue of each month.



TURNED
MACHINE SCREWS,
One-sixteenth to five-eighths diameter.
Heads and points to sample.
IRON, STEEL AND BRASS.
JOHN FELLOWS,

Successor to LYON & FELLOWS, Factory and Office, 14 Dunham Place, Williamsburgh, N. Y.



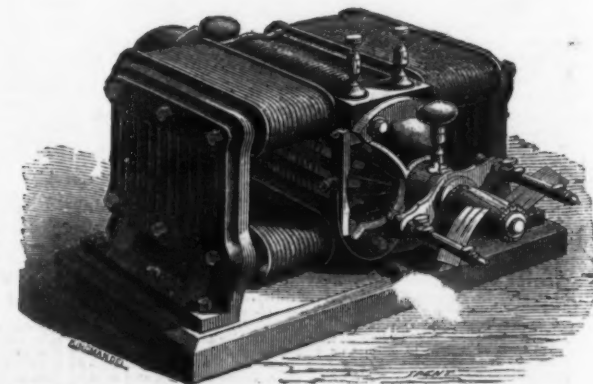
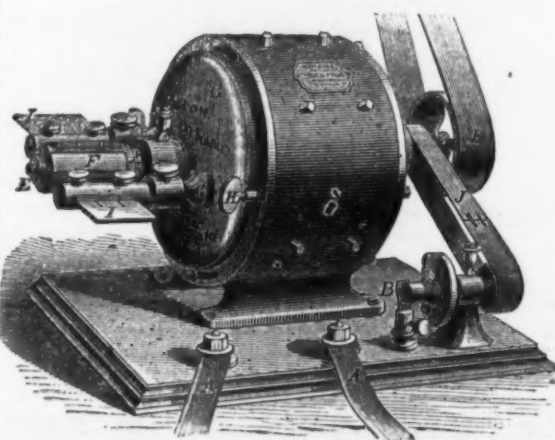
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WESTON DYNAMO-ELECTRIC MACHINE CO.

286 Washington Street, Newark, N. J., U. S. A.,

MANUFACTURERS OF

Machines for Electric Light, Electrotyping
and Electro-Plating.



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THE MOST POWERFUL, SIMPLE AND COMPACT ELECTRIC LIGHT
MACHINE IN THE WORLD.

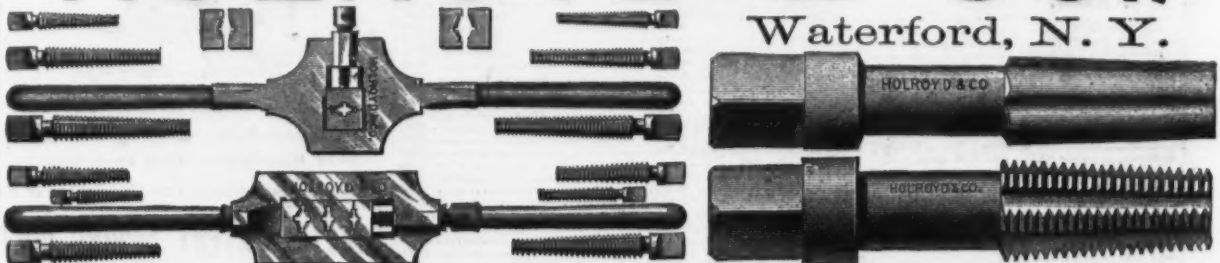
By actual tests this machine has been found to yield more than double the amount of light per horse-power obtained from the best machines built in this country.

Please send full particulars regarding buildings or localities to be lighted, available power, &c.

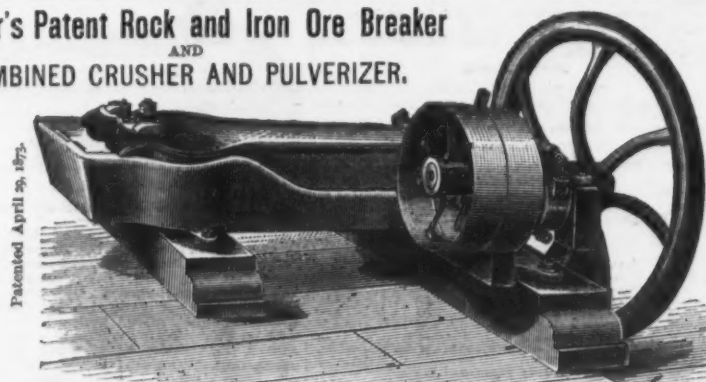
Centennial Gold Medal American Institute, 1876. Medal of Superiority, American Institute, 1877.
Centennial Medal, Philadelphia, 1876. Paris Medal, 1878.

HOLROYD & CO.,

Waterford, N. Y.

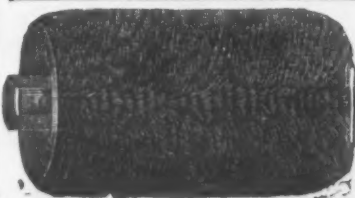


Forster's Patent Rock and Iron Ore Breaker
AND
COMBINED CRUSHER AND PULVERIZER.



The Blake Crusher Patent has expired. After six years of practical and constant use at the Etna Iron and Nail Works, Bridgeport, Ohio, to which Company all desiring information are respectfully referred, the Forster Crusher has demonstrated its superiority. It requires but one-third the power to run it. It requires less than one-half the expense to keep it in repair. It is the simplest machine ever made to accomplish the same amount of work. The saving in steam to run it, and the saving in expense of keeping in repair will pay for it in one year, besides saving all the annoyance and expense of delays. It will break rocks or iron ore to any required size, and can be so adjusted as to pulverize to any required fineness. Its capacity with three inch belt is thirty tons iron ore in ten hours. Larger machines in proportion. Every machine guaranteed as to efficiency, material and workmanship. We furnish of any required size—large or small. Its lightness and efficiency make it very desirable for gold and silver mining, all the parts being easily transported. We annex the testimony of a well known and thoroughly practical rolling mill manager:

Messrs. TOTTEN & CO.—DEAR SIRS: I have been operating constantly in connection with our works for nearly six years, one of Forster's Crushers, manufactured by you, for crushing ore, used in our puddling furnaces. I have a thorough practical acquaintance with the Crusher in general use, and have no hesitation in saying that the Forster Crusher will crush ore with one-third the power of the Blake Crusher, and with one-half the expense of keeping in repair. The dies can be so adjusted as to pulverize. I take pleasure in saying, after using it six years, that it is the simplest, most economical and most efficient Crusher I ever saw. All communications addressed to us will receive prompt attention.
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TOTTEN & CO., Rolling Mill and Heavy Machinery Founders, Pittsburgh, Pa.



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Hand Fan Blowers.

Every machine *guaranteed* or no sale.
Is now *improved* by lever attachment. Works precisely like bellows lever, or, if preferred, crank can be used.
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EXHAUST FANS

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Address,

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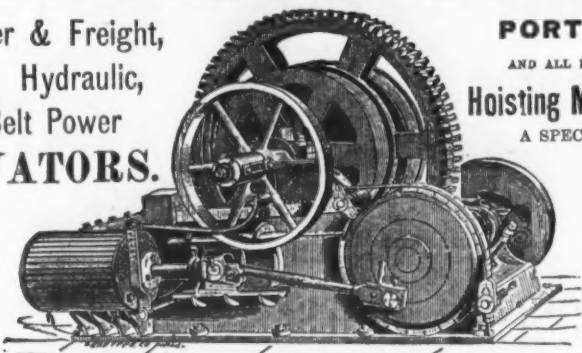
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FOR
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HYDRAULIC PRESSES
On hand and made to order.
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Steam, Hydraulic,
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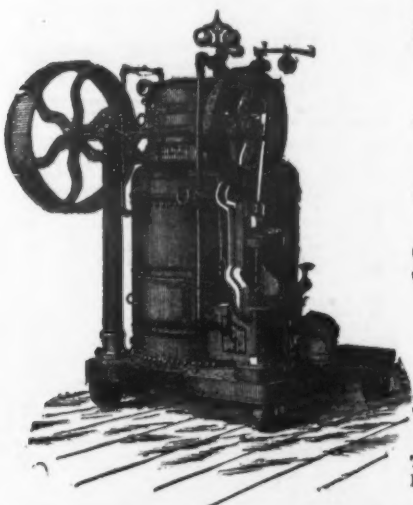


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A SPECIALTY.

IRON FURNACE HOIST,

For Handling Stock to Top of Stack with One or Two Platforms.

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Patented Feb. 10, 1874.
Reissued June 22, 1875.

Compact, Practical, Durable and Economical.

Acknowledged to be the best in use. This boiler stands unrivaled.

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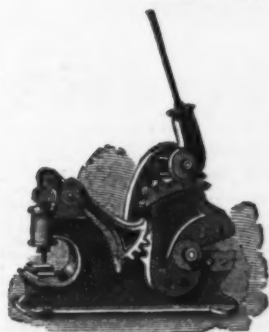
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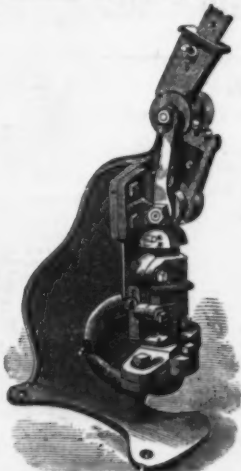
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Combination Punch and Shears.
Cuts Round and Flat Iron.



Punch $\frac{1}{4}$ to $\frac{1}{2}$ in., $\frac{1}{4}$ in. Plates.



Shears for Plates and Bars

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For Workers in Iron and Steel, adapted to all trades.
Send for circular and prices.



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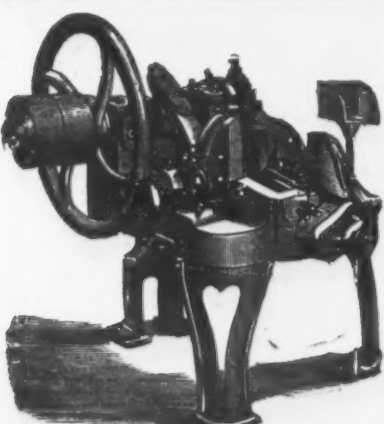
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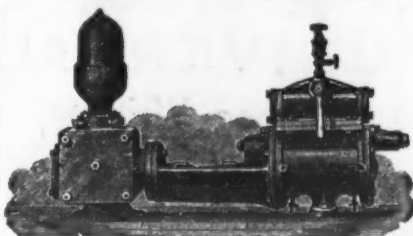


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THE HANCOCK INSPIRATOR,
New Combined Pump and Injector.

Eclipses all other appliances hitherto introduced for feeding Steam Boilers. A Portable Boiler is not perfect without one. It lifts its water 25 feet with a low steam pressure, and puts it directly into the Boiler. No adjustment necessary for varying steam pressures.
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Manufactured by
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"SPECIAL" STEAM PUMP

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OVER 35,000 HORSE-POWER NOW IN USE. ADAPTED FOR ALL PURPOSES.

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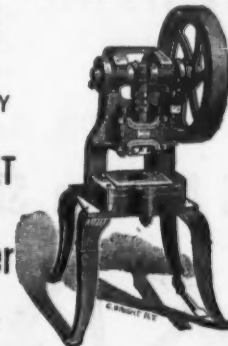
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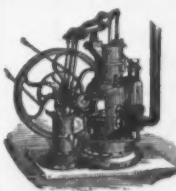


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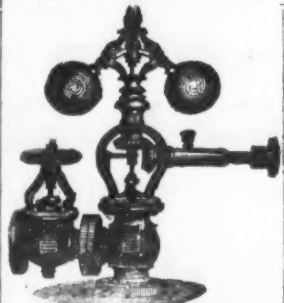
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It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in accuracy and durability—the main essentials—we guarantee it shall do more.

Reduced Price List.
OCTOBER 15, 1878.

For dimensions of Governor, see Illustrated Price List.



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No Charge for Boxing or Cartage.

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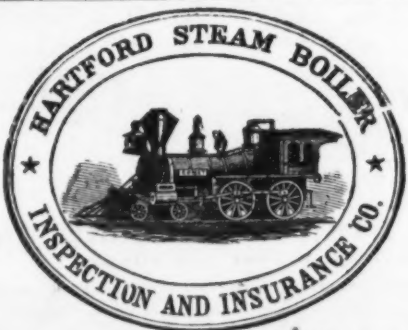
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Size of Governor	Black.	Fin. In.	EXTRA FOR			
			Ball and Lever.	Speeder.	Auto-matic Safety Check.	Stop Valve.
1/2 in.	\$16.00	\$18.00	\$1.00	\$2.25	.....	\$4.00
1 1/4	18.00	20.00	2.00	2.25	.....	5.00
1 3/4	20.00	22.00	2.50	2.50	.....	6.00
2	23.00	25.00	3.00	2.75	8.00	7.50
2 1/4	27.00	29.00	3.50	3.00	9.00	9.00
2 3/4	31.00	33.00	4.00	3.25	10.00	10.00
3	35.00	37.00	4.50	3.50	11.00	11.00
3 1/4	40.00	42.00	5.00	3.75	12.00	12.00
3 3/4	45.00	47.00	5.50	4.00	13.00	13.00
4	50.00	52.00	6.00	4.25	14.00	14.00
4 1/4	55.00	57.00	6.50	4.50	15.00	15.00
4 3/4	60.00	62.00	7.00	4.75	16.00	16.00
5	65.00	67.00	7.50	5.00	17.00	17.00
5 1/4	70.00	72.00	8.00	5.25	18.00	18.00
5 3/4	75.00	77.00	8.50	5.50	19.00	19.00
6	80.00	82.00	9.00	5.75	20.00	20.00
6 1/4	85.00	87.00	9.50	6.00	21.00	21.00
6 3/4	90.00	92.00	10.00	6.25	22.00	22.00
7	95.00	97.00	10.50	6.50	23.00	23.00
7 1/4	100.00	102.00	11.00	6.75	24.00	24.00
7 3/4	105.00	107.00	11.50	7.00	25.00	25.00

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1-4, and 1 inch by 1-8, as rapidly as

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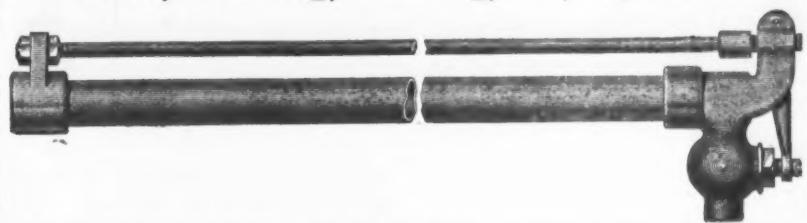
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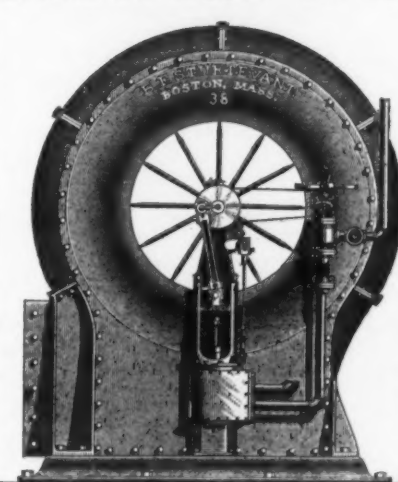
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For Blowing Furnaces of all kinds, such as are provided with grate bars; especially adapted for Steam Boilers, Puddling and Heating Furnaces. Coal Screenings and all kinds of refuse coal may be successfully used for fuel by the use of these Fans to create blast. For forcing fresh air into, or taking foul air out from Coal Mines and other places needing ventilation, such as Hospitals, Asylums, Theaters and other Public Buildings, Manufacturing Establishments, &c. Also for numerous other uses where large volume of air is required.

Sturtevant's Patent Steam Fan,

For Blowing Furnaces of all kinds, such as are provided with grate bars; especially adapted for Steam Boilers, Puddling and Heating Furnaces. Coal Screenings and all kinds of refuse coal may be successfully used for fuel by the use of these Fans to create blast. For forcing fresh air into, or taking foul air out from Coal Mines and other places needing ventilation, such as Hospitals, Asylums, Theaters and other Public Buildings, Manufacturing Establishments, &c. Also for numerous other uses where large volume of air is required.

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For removing Shavings and Dust from Wood-Working Machines, Dust from Sand and Emery Wheels, and for Ventilation.

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For Cupola Furnaces and Forges. The Blower, which exceeds all others, produces maximum results with minimum power. Used in the largest establishments in the country, where the strongest blast is required.

Sturtevant Patent Improved Fan Blower,

For Steam Boilers, Puddling and Heating Furnaces.

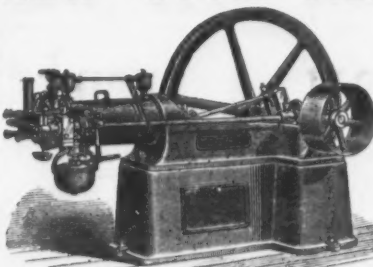
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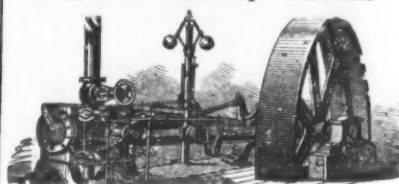
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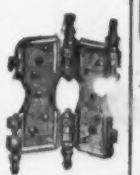
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